

DOCKET NO. 221 - Algonquin Gas Transmission Company and Islander East Company, L.L.C. application for a Certificate of Environmental Compatibility and Public Need for the construction, operation, and maintenance of a proposed new compressor station near East Johnson Avenue, Cheshire, Connecticut; a proposed new meter station adjacent to 67 Laydon Avenue, North Haven, Connecticut; and a new 24-inch diameter gas pipeline from the proposed North Haven meter station to Branford across Long Island Sound to the New York State line.	}	Connecticut
	}	Siting
	}	Council
	}	August 1, 2002

Findings of Fact

Introduction

1. Pursuant to Connecticut General Statutes (CGS) §16-50k, on December 7, 2001, the Algonquin Gas Transmission Company (AGT) and the Islander East Company, L.L.C. (IE) applied to the Connecticut Siting Council (Council) for a Certificate of Environmental Compatibility and Public Need (Certificate) for the construction of a new natural gas compressor station in Cheshire, a new natural gas meter station in North Haven, a new pipeline from North Haven to the Connecticut/New York state boundary in Long Island Sound, and related improvements to existing natural gas facilities in Connecticut. (AGT/IE 1a, pp. 1, 2)

2. The Federal Energy Regulatory Commission (FERC) has exclusive jurisdiction for the siting of interstate natural gas transmission facilities including the route selected, the determination of public need, and the mitigation of environmental impacts. The United States Department of Transportation (U.S. DOT) has exclusive jurisdiction over the regulation of the safety of interstate natural gas transmission facilities including the safety aspects of their design, construction, and maintenance. The FERC has encouraged applicants before it to cooperate with agencies, such as the Council, with regard to the siting of pipeline facilities, environmental mitigation measures, and construction procedures. (AGT/IE 1a, pp. 1, 2; AGT/IE 3, p. 1; AGT/IE 26, pp. 5, 6; TG 4, Response to Pre-Hearing Question (RPHQ) #11)

3. Pursuant to CGS §§16-50k and 16-50m, the Council, after giving due notice thereof, held public hearings for this proceeding on April 2, 2002, beginning at 7:00 p.m. in the Branford High School Auditorium, in Branford; on April 4, 2002, beginning at 7:00 p.m. in the Council Chambers of the Cheshire Town Hall, in Cheshire; on April 9, 2002, beginning at 7:00 p.m. in the North Haven High School Auditorium, in North Haven; and on April 11, 2002, beginning at 7:00 p.m. in the Totoket Valley Elementary School Cafeteria, in North Branford, Connecticut. The Council held evidentiary hearings on April 11, April 12, April 15, April 16, and April 17, 2002 in Conference Room #309 at the Central Connecticut State University (CCSU) Institute for Industrial and Engineering Technology (IIET), located at 185 Main Street, in New Britain. (Council's Revised Hearing Notice dated February 25, 2002; Council's Revised Hearing Notice dated April 1, 2002; Letter from S. Derek Phelps to Parties and Intervenors regarding the schedule for evidentiary hearings dated April 8, 2002; Transcript of April 2, 2002, 7:00 p.m. (Tr. 1), p. 2; Transcript of April 4, 2002, 7:00 p.m. (Tr. 2), p. 2; p. 4; Transcript of April 9, 2002, 7:00 p.m. (Tr. 3), p. 2; Transcript of April 11, 2002, 7:00 p.m. (Tr. 4), p. 2; Transcript of April 11, 2002, 12:30 p.m. (Tr. 5), p. 4; Transcript of April 12, 2002, 10:00 a.m. (Tr. 6), p. 4; Transcript of April 15, 2002, 10:00 a.m. (Tr. 7), pp. 4, 5; Transcript of April 16, 2002, 10:00 a.m. (Tr. 8), p. 5; Transcript of April 17, 2002, 10:00 a.m. (Tr. 9), p. 5)

4. AGT is an interstate natural gas pipeline company and a wholly owned subsidiary of Duke Energy Corporation. IE is a limited liability company whose members include Duke Energy Islander East Pipeline Company, L.L.C. and KeySpan Islander East Company, L.L.C. Duke Energy Islander East Pipeline Company, L.L.C. is a limited liability company and a wholly owned subsidiary of Duke Energy Transmission Corporation. KeySpan Islander East Company, L.L.C. is a limited liability company and a wholly owned subsidiary of KeySpan Energy Development Corporation. (AGT/IE 1a, p. 2; AGT/IE 26, pp. 3, 4; AGT/IE 26, Appendix D, p. 1; Tr. 6, p. 12; Tr. 7, p. 214; Tr. 8, pp. 184, 187)
5. Pursuant to CGS §16-50l(b), public notice of the application was published in the New Haven Register and the Waterbury Republican American on November 20, 2001 and November 27, 2001, and in the Branford Review on November 21, 2001 and November 28, 2001. (AGT/IE 11; AGT/IE 12)
6. The applicants certified that copies of the application for a Certificate were sent to municipal, regional, state, and federal officials, pursuant to CGS § 16-50l(b) on or about December 7, 2001. The applicants also certified that a copy of the application was provided to the FERC on December 19, 2001; and the United States Army Corps of Engineers, the National Marine Fisheries Service (NMFS), and the Connecticut Department of Agriculture, Bureau of Aquaculture (DOA) on January 24, 2002. (AGT/IE 1a, Transmittal letter and service list dated December 7, 2001; AGT/IE 13)
7. The applicants filed an application for a Certificate of Public Convenience and Necessity with the FERC for the proposed project on June 15, 2001. The applicants provided copies of the FERC application to the Towns of Cheshire, Wallingford, North Haven, East Haven, North Branford, and Branford on June 15, 2001. (AGT/IE 1b, Appendix 6, p. 1; AGT/IE 3, p. 1; AGT/IE 26, p. 5; TG 1, p. 2; AG 1, p. 1)
8. The Council and its staff conducted public field reviews on April 2, April 4, and April 9, 2002 of the existing right-of-way (ROW) for the AGT 10-inch C-1 and 16-inch C-1L natural gas pipelines in the Towns of Cheshire, Wallingford, and North Haven; the proposed natural gas compressor station site in Cheshire; the natural gas meter station site in North Haven; and the proposed and alternate pipeline routes in the Towns of North Haven, East Haven, North Branford, Branford, and Guilford. (Council's Revised Hearing Notice dated February 25, 2002; Council's Revised Hearing Notice dated April 1, 2002; Letter from S. Derek Phelps to Council Members regarding public field reviews dated March 14, 2002)
9. Parties and Intervenors to this proceeding include The applicants, Rebecca Mars, the Branford Land Trust, Inc. (BLT), the Town of Guilford (TG), the Town of Branford (TB), State Representative Patricia Widlitz, Attorney General Richard Blumenthal (AG), Iroquois Gas Transmission System, L.P. (Iroquois), State Senator William A. Aniskovich, Save the Sound, Inc., State Representative Peter J. Panaroni, Jr., the Town of North Branford, the Menunkatuck Audobon Society, Mark DeFelice, Tilcon Inc. and BSR Company (BSR), Juniper Point Association, CT Stop the Pipeline, Edward P. Lang, Raymond J. Gincavage, William and Susan Lazine, Paul and Jacqueline Vierling Huang, and the Town of North Haven. The Town of North Branford withdrew as a party in this proceeding on April 11, 2002. (Service List dated April 17, 2002; Letter from John M. Gesmonde to the Council dated April 11, 2002; Tr. 1, p. 5; Tr. 5, pp. 2, 3)

10. The purpose of the proposed project is to improve existing natural gas facilities and provide approximately 27.5 million cubic feet per day of natural gas to energy markets in Connecticut, and Long Island and New York City, New York. The proposed project would supply natural gas to electric generating facilities and local gas distribution companies in New York. The proposed project could also supply natural gas to electric generating facilities and local gas distribution companies in Connecticut. (AGT/IE 1a, p. 3; AGT/IE 1b, Appendix 4, p. 1)

AGT Compressor Station

11. AGT proposes to construct a natural gas compressor station in the Town of Cheshire at approximately milepost (MP) 0.1. The center of the proposed natural gas compressor station site is located approximately 500 feet south of Interstate 691, approximately 2,100 feet east of Route 10, and approximately 900 feet north of East Johnson Avenue. The proposed natural gas compressor station site is located at the beginning of the existing C-1 and C-1L natural gas pipelines. (AGT/IE 1a, pp. 5, 69, 97, 113, 134, 136, Figure 15; AGT/IE 1a, Appendix 1, DWG No. IE-01; AGT/IE 1b, Appendix 6, pp. 1, 2; AGT/IE 1b, Appendix 6, Addendum 1, p. 1; AGT/IE 1c, Sheet IE-A-CT-Comp01; AGT/IE 26, pp. 4, 15; AGT/IE 26, Appendix D, p. 1, 9; AGT/IE 26, Appendix H, p. 1; Tr. 6, p. 115)
12. The proposed natural gas compressor station site is an approximate 61-acre parcel, which is zoned as an Interchange zone. An Interchange zone allows for office industrial development and light manufacturing. The proposed compressor station site is predominantly cropland in the southern and western portions, with some forested land to the north and east. AGT proposes to use approximately 7.2 acres for the operation of the proposed natural gas compressor station and approximately 1.5 acres for the proposed permanent access road. (AGT/IE 1a, pp. 5, 42, 66, 69, 113, 114, 116, 134, 135; AGT/IE 1c, Sheet IE-A-CT-Comp01; AGT/IE 6a, 6c; AGT/IE 25, Nov. 2, 2001, RPHQ #37; AGT/IE 26, p. 15; Letter from the Town of Cheshire Planning and Zoning Commission to the Council dated November 9, 2001)
13. The proposed compressor station would consist of a control/auxiliary building, a compressor building, and associated equipment including piping, launchers, fencing, and pavement. The control/auxiliary building would include space for offices, a utility area, a control room for the compressor station, storage for supplies and materials, a washroom, a workshop, a 395-kW emergency generator, and an air compressor. The proposed compressor building would house a new 10,310 horsepower Solar Taurus 70 gas turbine. A boiler, with a rating of 1.7 million British thermal units per hour (MMBtu), would be installed at the proposed compressor station site. A permanent security fence would be installed around the proposed compressor station. (AGT/IE 1a, pp. 5, 41, 42, 136, 140, 143; AGT/IE 1b, Appendix 6, p. 2; AGT/IE 19, RPHQ #83, Question 20; AGT/IE 26, pp. 15, 43; AGT/IE 26, Appendix D, pp. 2, 18, 20)
14. Vehicular access to the proposed compressor station site would be along a new approximately 1,640 foot long by 40-foot wide access road extending north from East Johnson Avenue. The proposed access road and parking areas for the proposed compressor station would consist of asphalt or gravel. The proposed access road for the proposed compressor station may encroach upon approximately 160 feet of wetlands located approximately 350 feet north of East Johnson Avenue. (AGT/IE 1a, pp. 13, 42; AGT/IE 1ac, Sheets IE-A-CT-COMP01, IE-A-CT-UP01; AGT/IE 25, Nov. 2, 2001, RPHQ #42)

15. Piping installed below grade at the proposed compressor station site would be coated for corrosion protection prior to backfilling, and a cathodic protection system would be installed to protect underground piping. (AGT/IE 1a, p. 42; Tr. 7, p. 245)
16. The proposed compressor station would be designed for remote control operation; however, two personnel would be assigned to the proposed compressor station on a full-time basis for maintenance purposes. Standard maintenance procedures would include activities such as the calibration, inspection, upkeep, and repair of equipment; and pressure, temperature, and vibration monitoring. (AGT/IE 1a, pp. 46, 47)
17. The proposed compressor station would have controls and safety devices such as an emergency shutdown system, relief valves, gas and fire detection equipment, overspeed and vibration protection, and on/off-engine protection devices. (AGT/IE 1a, p. 42)
18. Construction of the proposed compressor station would require site clearing and grading, foundation excavation and installation, pipeline construction, finish grading, and site cleanup. AGT proposes to construct the proposed compressor station between May 2003 and October 2003. Work at the proposed compressor station site would typically be conducted between 7:00 a.m. and 6:00 p.m., six days per week. (AGT/IE 1a, pp. 45, 144, 145; AGT/IE 26, p. 38; Tr. 8, p. 144)

AGT Proposed Pipeline Improvements

19. AGT proposes to retest and upgrade a total of 27.4 miles of its existing ten-inch C-1 and 16-inch C-1L natural gas pipelines in the Towns of Cheshire, Wallingford, and North Haven from the current maximum allowable operating pressures of 750 pounds per square inch (PSI) to a new maximum operating pressure of 814 PSI. The existing C-1 and C-1L natural gas pipelines parallel each other, and are each approximately 13.7 miles in length. (AGT/IE 1a, pp. 3, 5, 33; AGT/IE 1b, Appendix 6, p. 1; AGT/IE 1c, Sheets IE-A-CT-UP01 to UP15; AGT/IE 26, pp. 4, 15, 16; AGT/IE 26, Appendix H, p. 1; AGT/IE 31; Tr. 6, pp. 100, 101)
20. AGT proposes to expose, inspect, and repair approximately two 25-foot segments of the ten-inch C-1 natural gas pipeline in the Town of Cheshire at approximately MP 3.8. Anomaly investigations would require excavating a trench approximately 25 feet long, ten to 20 feet wide, and eight feet deep. The width of the trench at the top may be greater in unstable soils. (AGT/IE 1a, pp. 3, 5, 34; AGT/IE 1a, Appendix 1, DWG No. IE-02; AGT/IE 1b, Appendix 6, pp. 1, 2; AGT/IE 26, p. 16; Tr. 6, pp. 90, 100, 101)
21. AGT proposes to remove two existing launchers used for the internal inspection of the pipelines from the existing mainline valve and interconnect facility in the Town of Cheshire at approximately MP 0.6, and relocate the launchers to the proposed compressor station site. The proposed relocation of the two existing launchers would allow inspection and cleaning of a greater portion of the C-1 and C-1L pipelines, and would consolidate more facilities at the proposed compressor station site. (AGT/IE 1a, pp. 6, 43, 97, 114, 116; AGT/IE 1a, Appendix 1, DWG No. IE-01; AGT/IE 1b, Appendix 6, p. 2)
22. AGT proposes to inspect, and if necessary, repair the existing C-1 pipeline at MP 3.8; retest and upgrade the existing C-1 and C-1L pipelines; and undertake the launcher relocation between May 2003 and August 2003. (AGT/IE 1a, p. 45; AGT/IE 26, p. 38)

IE Proposed Project

23. In Connecticut, IE proposes to construct approximately 21.2 miles of a new 24-inch diameter natural gas pipeline from the North Haven Meter Station through North Haven, East Haven, North Branford, and Branford, through Long Island Sound to the Connecticut/New York State boundary. The proposed pipeline would have a maximum allowable operating pressure of 900 PSI. The proposed pipeline would be operated and maintained by AGT personnel. (AGT/IE 1a, pp. 3, 6, 80, Figure 1; AGT/IE 1a, Appendix 1, DWG Nos. IE-04, IE-05, IE-06, IE-07; AGT/IE 1b, Appendix 4, p. 1; AGT/IE 1b, Appendix 5, p. 1; AGT/IE 1b, Appendix 6, p. 1; AGT/IE 1c; AGT/IE 26, pp. 4, 17; AGT/IE 26, Appendix H, p. 1; Tr. 7, p. 246)
24. IE proposes to install metering equipment at AGT's existing North Haven Meter Station site at 67 Laydon Drive in North Haven. The North Haven Meter Station is located at approximately MP 13.7 on AGT's existing C-1 and C-1L pipelines, and at MP 0.0 on IE's proposed pipeline route. The construction and operation of IE's proposed metering equipment would encompass approximately 0.8 acres at the North Haven Meter Station site. (AGT/IE 1a, pp. 6, 42, 97, 114, 116, 134, 135; AGT/IE 1a, Transmittal Letter dated December 7, 2001; AGT/IE 1a, Appendix 1, DWG No. IE-04; AGT/IE 26, pp. 16, 17)
25. IE proposes to construct two new mainline valves in the Towns of North Branford and Branford at approximately MP 6.0 and MP 9.9, respectively. The proposed mainline valves would be located within an approximately 30-foot by 50-foot fenced compound within the permanent ROW, and would be six to eight feet in height. (AGT/IE 1a, pp. 6, 43, 97, 134, 135; AGT/IE 1a, Appendix 1, DWG No. IE-06, IE-07; AGT/IE 1c, IE-A-CT-0006, IE-A-CT-0010)
26. IE proposes to install the new meter station equipment at the North Haven Meter Station site between June 2003 and October 2003. (AGT/IE 1a, p. 45)

Proposed Route

27. IE's proposed pipeline route would be located parallel to AGT's existing 8-inch diameter C-5 pipeline from the existing North Haven Meter Station to the BSR tracks in North Branford from MP 0.1 to MP 6.1; then parallel to the BSR tracks from MP 6.1 to MP 10.1, except for deviations at MP 7.4 for approximately six-tenths of a mile and at MP 9.7 for approximately two-tenths of a mile; and then from Branford through Long Island Sound to the Connecticut /New York State boundary, from MP 10.2 to MP 21.2. The proposed pipeline could safely coexist alongside and under the BSR tracks based upon the proposed separation distance, construction methods, and depth of burial. (AGT/IE 1a, pp. 9, 34, 83, 96, 97, 117, 126, 147, Figure 1; AGT/IE 1b, Appendix 4, pp. 2, 44; AGT/IE 1b, Appendix 6, p. 2; AGT/IE 1b, Appendix 6, Addendum 1, p. 1; AGT/IE 1c, Sheets IE-A-CT-0000 to 0011; AGT/IE 21, RPHQ TB-13; AGT/IE 25, Nov. 2, 2001, RPHQ #44; AGT/IE 26, pp. 17, 18; TB 5, p. 4; Tr. 5, p. 53)

28.

Summary of Proposed Islander East Pipeline Route

Description	Quantity/Length	Source
On-shore length	10.2 Miles	AGT/IE 1a, Table 1
Off-shore length*	11 Miles	AGT/IE 1a, Tables 1, 22
Roads crossed	24	AGT/IE 1a, Table 5
Railroad crossings	6	AGT/IE 1a, Table 5
Perennial waterbodies crossed	19	AGT/IE 1a, Table 9 AGT/IE 1b, App. 6, p. 8 AGT/IE 26, App. H, pp. 4, 5, 6, 17
Wetlands crossed	53 3.3 miles	AGT/IE 26, App. H, pp. 9, 11 - 13 AGT/IE 1a, Table 11
Forested land crossed**	2.9 miles	AGT/IE 1a, Table 22
Agricultural land crossed	1.4 miles	AGT/IE 1a, Table 22
Commercial buildings within 50 feet of construction work area	12	AGT/IE 1a, Table 25
Residential buildings within 50 feet of construction work area	36	AGT/IE 1a, Table 26
Land trust land crossed	0.6 miles	AGT/IE 1a, Table 28 AGT/IE 33
Shellfish beds crossed***	1.5 miles	AGT/IE 1a, Table 30

*Distance to Connecticut/New York State Boundary.

** Includes Forested Wetlands.

*** Includes Horizontal Directional Drill Segment

29. In residential areas, the applicants would limit removal of trees; restore all lawns and landscaping within the proposed construction work area promptly after backfilling the trench; and install and maintain construction fencing at the edge of the construction work area for a distance of 100 feet on either side of the residence. The applicants would develop site-specific construction plans for residences within 50 feet of the proposed construction work area. (AGT/IE 1a, pp. 120 to 123, 156; AGT/IE 30)
30. The proposed project facilities would not cross Native American reservations, national forests, national natural landmarks, nationally designated wild and scenic rivers, wildlife management areas, registered national landmarks, or state forests. IE's proposed pipeline route, with the inclusion of the Pond Alternative route, would cross one North Haven Land Trust property at MP 0.3 for approximately 320 feet; one North Branford Land Trust property at MP 4.2 for approximately 1,200 feet; and three Branford Land Trust properties between MP 8.1 and MP 9.7 for a total of approximately 1,555 feet. (AGT/IE 1a, pp. 124, 125; AGT/IE 24, RPHQ BLT-2; AGT/IE 33; BLT 1, Document 1; BLT 2, RPHQ IE-2; BLT 4, pp. 2, 3, 8; Tr. 9, p. 179)

31. IE's proposed off-shore pipeline route traverses a charted cable area from Juniper Point, Branford to Lewis and Belden Islands; however, the proposed horizontal direction drill (HDD) segment would pass beneath this mapped area. IE's proposed off-shore pipeline route would traverse the FLAG Atlantic-1 and MCI telecommunications cables, and a high voltage direct current electric transmission cable. IE's proposed off-shore pipeline route would not traverse any designated anchorage areas or lightering areas, or dredge material dumping grounds. (AGT/IE 1a, pp., 131, 132; AGT/IE 1b, Appendix 4, pp. 17, 18, 56, Map titled Proposed Marine Pipeline Route Long Island Sound Crossing Branford Connecticut-Wading River, New York dated May 15, 2001; AGT/IE 14, RPHQ #28, RPHQ #29, RPHQ #31; AGT/IE 23, RPHQ OAG-3; AGT/IE 25, Nov. 2, 2001, RPHQ #35)

Alternative Routes

32. The applicants identified and evaluated a pipeline replacement alternative; several on-shore route alternatives identified as the Sachem Head Alternative, the Short Beach Alternative, the Pond Alternative, the Salt Marsh Alternative, the Pine Orchard Alternative; and two off-shore route alternatives identified as the Option 2 and Option 3 Alternatives. The applicants propose to co-locate the proposed alternative on-shore pipeline routes along existing ROW or utility corridors in order to minimize the creation of new ROW corridors, and avoid residential, business, and commercial areas, wetlands, waterbodies, critical habitats, water supply areas, historic areas, and undesirable geological conditions. (AGT/IE 1a, pp. 147, 148)

Replacement Alternative

33. The applicants evaluated the possibility of removing AGT's existing C-5 pipeline between MP 0.0 and MP 6.1, along IE's proposed pipeline route, and replacing it with a new 24-inch-diameter pipeline. This alternative would minimize the need for additional permanent ROW between MP 0.0 and MP 6.1; however, it would require taking AGT's existing C-5 pipeline out of service for an extended period of time, which would interrupt deliveries to Southern Connecticut Gas Company. (AGT/IE 1a, pp. 148, 149; AGT/IE 14, RPHQ #1)

Sachem Head Alternative Route

34. The proposed Sachem Head Alternative route would deviate from IE's proposed route at MP 7.6 and proceed to the southeast for approximately 1,000 feet until it crosses under a powerline, then northeast adjacent to the powerline for approximately 1,500 feet until it crosses under another powerline, then southeast adjacent to the second powerline for approximately 4.4 miles, then the Sachem Head Alternative route leaves the powerline and proceeds south for approximately 2.3 miles to the shoreline. Once off-shore, the Sachem Head Alternative route proceeds southeast and then southwest for approximately 7.8 miles until it rejoins the proposed route at MP 17.9. (AGT/IE 1a, pp. 149, 150, Figure 16; AGT/IE 22, Sachem Head Alternative; TG 1, p. 5)
35. The applicants evaluated the Sachem Head Alternative route at the request of the Department of Agriculture, Division of Aquaculture in order to avoid crossing mapped shellfish lease beds. The proposed Sachem Head Alternative route would avoid shellfish lease beds. The proposed Sachem Head Alternative route would be approximately 4.2 miles longer on-shore and approximately the same distance off-shore as IE's proposed route; however, it would cross more waterbodies, wetlands, and forested land than the proposed route; and would impact trails, state forest land, and Guilford Land

Trust land. The Sachem Head Alternative would result in greater environmental impacts than the proposed route. IE did not undertake site specific evaluations and impact assessments for the proposed Sachem Head Alternative route, nor does IE propose to construct the proposed pipeline along the Sachem Head Alternative route. (AGT/IE 1a, pp. 149, 150, 152; AGT/IE 3, p. 5; AGT/IE 20, RPHQ #74, RPHQ #77; AGT/IE 22, Sachem Head Alternative; TG 1, pp. 5, 6, 7; TG 4, p. i; TG 4, RPHQ #1, #4, #6, #8, #9; TB 5, p. 4; BLT 2, RPHQ IE-3; Tr. 5, pp. 89 to 97)

Short Beach Alternative

36. The Short Beach Alternative route would deviate from IE's proposed route at MP 2.9, and proceed south and southwest for approximately 4.6 miles adjacent to the west side of an existing powerline corridor, then from a point approximately 1,400 feet north of Interstate 95 (I-95), the Short Beach Alternative route deviates from the powerline corridor and proceeds south for approximately 5,500 feet, then southeast for approximately 5,500 feet, then southwest for approximately 2,000 feet to the shore in Branford. Once off-shore, the Short Beach Alternative route proceeds southeast until it rejoins the proposed route at MP 16.2. (AGT/IE 1a, pp. 152, 154, Figure 17; AGT/IE 22, Short Beach Alternative)
37. The proposed Short Beach Alternative route would be approximately the same length on-shore and approximately one mile longer off-shore; and would cross fewer perennial streams, wetlands, and agricultural land than IE's proposed route. The proposed Short Beach Alternative route would traverse approximately 2.3 miles of shellfish beds, not including a HDD segment, and two Branford Land Trust properties; would be proximate to more residences, especially south of Interstate 95; would be more difficult to construct; and would traverse more water supply watershed land and forested land than the proposed route. The proposed Short Beach Alternative route would be located between 400 and 2,000 feet east of Lake Saltonstall, a public water supply reservoir, from Interstate-95 north for approximately 2.6 miles. Six state-listed endangered, threatened, or special concern species may be present along the Short Beach Alternative route. IE does not propose to construct the proposed pipeline along the Short Beach Alternative route. (AGT/IE 1a, pp. 91, 154, 155, 156; AGT/IE 1b, Appendix 6, Attach. C, Sheet 2; AGT/IE 14, RPHQ #24; AGT/IE 16, RPHQ #54; RPHQ #55; AGT/IE 22, Short Beach Alternative; TB 5, p. 4; BLT Letter and attached map from William C. Horne to S. Derek Phelps dated March 17, 2002; BLT 2, RPHQ IE-3; BLT 4, pp. 2, 5)

Pond and Salt Marsh Alternative Routes

38. The proposed Pond Alternative route would deviate from the proposed route at approximately MP 9.7 and continue south adjacent to the west side of the BSR tracts until it rejoins IE's proposed route at MP 9.9. The proposed Pond Alternative route would cross a perennial waterbody at approximately MP 9.8, and would impact more wetlands than IE's proposed route. The proposed Pond Alternative route would be shorter in length than IE's proposed route, and would reduce the impacts to land owned by the BLT. The perennial waterbody that would be crossed by the proposed pipeline is approximately two to three feet deep; dominated by Common reed, an invasive wetland plant; has low water quality; and limited habitat, educational, or uniqueness value. IE supports the proposed Pond Alternative route. (AGT/IE 1a, pp. 156, 158, 159, Figure 18, Table 44; AGT/IE 1c, Sheet IE-A-CT-0010; AGT/IE 15, RPHQ #38; AGT/IE 24, RPHQ BLT-5; AGT/IE 26, pp. 23, 24; AGT/IE 33; Tr. 5, p. 144)

39. The proposed pipeline route would traverse a BLT property, identified as the Goss property, at approximately MP 9.7 in Branford. The Goss property is located west of the BSR tracks and east of Route 146. The approximately 12-acre Goss property consists of an oak-hickory forest community that provides important habitat that complements and enhances the ecological value of the nearby tidal marshes. The Goss property is traversed by a recreational hiking trail. (BLT 1, Document I, pp. 2, 3; BLT 2, RPHQ IE-2; BLT 4, pp. 3, 4, 7; AGT/IE 25, Nov. 2, 2001, RPHQ #53; Tr. 9, pp. 187, 188)
40. The proposed Salt Marsh Alternative route would deviate from IE's proposed Route at approximately MP 9.4 and continue south adjacent to the east side of the BSR tracks, then cross back from the east side to the west side of the BSR tracks to rejoin IE's proposed route at MP 9.9. The proposed Salt Marsh Alternative route would be shorter in length than the proposed route, and would reduce the impacts to land owned by the BLT. The proposed Salt Marsh Alternative route would cross approximately 910 feet of estuarine wetlands. (AGT/IE 1a, pp. 156, 158, 159, Figure 18, Table 44; AGT/IE 1c, Sheet IE-A-CT-0010)

Pine Orchard Alternative Route

41. The proposed Pine Orchard Alternative route would deviate from IE's proposed route at MP 9.6, south of the Amtrak Railroad tracks, and proceed southwest across approximately 450 feet of forested land, then southwest for approximately 1,250 feet, then south for approximately 1,200 feet, then southwest for approximately 350 feet to a proposed HDD work area. The proposed pipeline would be installed using HDD from the proposed work area on the Pine Orchard Yacht and Country Club southwest to the proposed route at approximately MP 10.8. (AGT/IE 1a, p. 159, Figure 19; AGT/IE 14, RPHQ #34; AGT/IE 25, Nov. 2, 2001, RPHQ #53)
42. The proposed Pine Orchard Alternative route would traverse less wetlands, forested land, and Branford Land Trust land than IE's proposed route. The proposed Pine Orchard Alternative route would be longer than the corresponding segment of IE's proposed route; would cross two additional perennial waterbodies; would temporarily impact the use of portions of the Pine Orchard Yacht and Country Club; and would be closer to more residences and therefore could have greater noise impacts than IE's proposed route. In addition, HDD from the proposed work area on the Pine Orchard Yacht and Country Club to MP 10.8 would result in undesirable stresses on the HDD equipment and the proposed pipeline during pullback. (AGT/IE 1a, pp. 159, 161; AGT/IE 14, RPHQ #22, RPHQ #23, RPHQ #34; AGT/IE 25, Nov. 2, 2001, RPHQ #53)

Option 2 and Option 3 Off-shore Alternative Routes

43. IE identified two off-shore alternative routes to the proposed route between MP 10.9 and MP 16.2 to minimize the crossing of shellfish beds. The Option 2 Alternative route follows the same alignment as IE's proposed route between MP 10.9 and MP 11.7, then the Option 2 Alternative route deviates and continues south, between 500 feet and 2,000 feet east of IE's proposed route to MP 16.2. The Option 3 Alternative route deviates from IE's proposed route at MP 10.9 and proceeds south, southeast, and then south again, between 2,000 and 5,800 feet east of IE's proposed route, and between 1,000 and 3,700 feet east of the Option 2 Alternative route to MP 16.2. (AGT/IE 1a, p. 162, Figure 20; AGT/IE 1b, Appendix 4, pp. 27, 33)

44. The Option 2 and Option 3 Alternative routes would be shorter in length, and cross fewer shellfish beds than the proposed route. Shallow depth to bedrock and steep terrain exists along portions of the Option 2 and Option 3 Alternative routes. (AGT/IE 1a, p. 164; AGT/IE 1b, Appendix 4, pp. 2, 27, 33, 46 to 49, 57, 59)

Deviations from the Proposed Route

45. IE proposes to install the pipeline along the west side of the BSR tracks between MP 7.0 and MP 7.3, which could impact the property and operations of G&G Construction (Ghiroli). IE could relocate the proposed pipeline farther to the west along the Ghiroli property into a wetland setback area. Deviating from the proposed route to the western portion of the Ghiroli property may minimize impacts to the operations of G&G Construction, but would impact approximately 1,075 feet of forested wetlands. Relocating the proposed pipeline to the east side of the BSR tracks would avoid impacts to the Ghiroli property, but would impact the property and operations of Blakeslee Prestress, Inc. IE supports relocating the proposed pipeline to the western edge of the usable space on the Ghiroli property. (AGT/IE 1c, Sheet IE-A-CT-0008; AGT/IE 15, RPHQ #47; RPHQ #48; AGT/IE 19, RPHQ #83, Question 17; AGT/IE 26, pp. 25, 27; AGT/IE 31; TB 5, p. 5)
46. IE proposes to install the pipeline along the east side of the BSR tracks between MP 7.7 and Boston Post Road (U.S. Route 1), which would cross approximately 590 feet of wetlands and the Branford River. Deviating the proposed route to the west side of the BSR tracks would cross approximately 800 feet of wetlands and the Branford River; would require crossing the BSR tracks two more times; and would require crossing a sanitary sewer line near the Branford River. (AGT/IE 1c, Sheet IE-A-CT-0008; AGT/IE 15, RPHQ #49; AGT/IE 19, RPHQ #83, Question 10)
47. IE proposes to install the pipeline along the west side of the BSR tracks between approximately MP 8.7 and Route 146 (MP 8.95), which would cross approximately 1,100 feet of wetlands. Relocating the proposed pipeline to the east side of the BSR tracks between MP 8.7 and MP 8.95 would impact Branford Land Trust land; would require blasting of exposed bedrock; and would impact approximately 400 feet of wetlands. IE could reduce the proposed construction ROW by approximately 25 feet between MP 8.7 and MP 8.95. (AGT/IE 1c, Sheet IE-A-CT-0009; AGT/IE 15, RPHQ #51; AGT/IE 19, RPHQ #83, Question 10; AGT/IE 20, RPHQ #80; TB 5, p. 5; Tr. 8, pp. 236, 237)
48. IE proposes to install the pipeline along the east side of the BSR tracks between Route 146 (MP 8.95) and MP 9.4, which would cross approximately 1,000 feet of wetlands, and a vernal pool. IE evaluated an alternative alignment that places the proposed pipeline on the west side of the BSR tracks and associated marshalling yard between MP 9.15 and MP 9.4. Deviating the proposed route between MP 9.15 and MP 9.4 to the west side of the marshalling yard would result in two additional crossings of the BSR "Y" tracks, but would reduce disturbance to wetlands by approximately 850 feet. IE could minimize impacts on rail operations by boring the proposed pipeline beneath the "Y" tracks between MP 9.25 and MP 9.42, increasing the depth of burial, and using a heavier wall pipe. IE supports the proposed route deviation between MP 9.15 and MP 9.4. (AGT/IE 1c, Sheet IE-A-CT-0010; AGT/IE 15, RPHQ #52; AGT/IE 19, RPHQ #82; AGT/IE 19, RPHQ #83, Question 10; AGT/IE 20, RPHQ #81; AGT/IE 21, RPHQ TB-7; AGT/IE 25, Nov. 2, 2001, RPHQ #41; AGT/IE 26, pp. 25, 26, 27; AGT/IE 31; Tr. 5, p. 53; Tr. 8, pp. 215 to 220)

49. IE proposes to cross from the east side of the BSR tracks to the west side at approximately MP 8.6. IE could move the proposed pipeline crossing at approximately MP 8.6 to the north by approximately 30 feet to avoid impacts to a BLT property. Moving the proposed crossing of the BSR tracks at MP 8.6 to the north by approximately 30 feet would not traverse the property on the west side of the BSR tracts identified as NHV 175.1. (AGT/IE 1c, Sheet IE-A-CT-0009; Tr. 9, pp. 179, 196, 199)
50. The Wightwood School is located north of Route 146 in Branford at approximately MP 8.95 along IE's proposed route. The proposed pipeline would be located approximately 150 feet east of the Wightwood School. (AGT/IE 1c, Sheet IE-A-CT-0009; TB 5, p. 5)
51. The FERC reviewed various route alternatives and deviations from the proposed route in preparation of the Draft Environmental Impact Statement (DEIS). The FERC's DEIS recommends the proposed route with the route deviation identified as the Pond Alternative route. The FERC's DEIS does not recommend the pipeline Replacement Alternative, the Sachem Head Alternative route, the Short Beach Alternative Route, the Pine Orchard Alternative route, or the Option 2 and Option 3 off-shore Alternative routes. (AGT/IE 26, pp. 14, 15, 23, 24; AGT/IE 31; FERC's DEIS, pp. 4-22 to 4-29, 4-37, 4-40, 5-10, 5-16)

Proposed Land Requirements

52. The applicants have established a separation distance of 20 feet between the proposed pipeline and the existing C-5 pipeline between MP 0.0 and MP 6.1 along IE's proposed route. IE could reduce the separation distance between the proposed pipeline and the existing C-5 pipeline to ten feet in residential areas, or where there is insufficient space for normal installation procedures. The applicants have established a separation distance of 25 feet between the proposed pipeline and the existing BSR tracks to allow for the safe uninterrupted operation and maintenance activities of the BSR. (AGT/IE 1a, p. 9; AGT/IE 14, RPHQ #1, #2; AGT/IE 19, RPHQ #79; AGT/IE 21, RPHQ TB-8; AGT/IE 26, pp. 17, 18; AGT/IE 31; Tr. 5, p. 60; Tr. 8, pp. 156, 179, 219)
53. The amount of land required to construct the proposed pipeline would depend on the type of construction activity being undertaken, the topography of the area, and the existing land use along the proposed pipeline route. IE proposes to use an approximately 75-foot wide construction ROW for the installation of the terrestrial portion of proposed pipeline. Approximately 25 feet of the proposed construction ROW would be used for the temporary storage of excavated material, while approximately 50 feet would be used to assemble and install the proposed pipeline. In the waters of Long Island Sound, IE would require a primary work area approximately 80 feet in width, centered over the proposed pipeline. (AGT/IE 1a, pp. 7, 8, 64, 78, Table 3; AGT/IE 1a, Appendix 2; AGT/IE 1a, Appendix 3, p. 3-1, Figures #1, #2; AGT/IE 26, p. 17; AGT/IE 31a; TG 4, RPHQ #5; Tr. 5, p. 62; Tr. 8, p. 156)
54. AGT proposes to use between 25 and 110 feet of construction ROW to undertake the proposed AGT pipeline retest and anomaly investigations. AGT would retain a permanent ROW width of 50 feet to accommodate operation and maintenance of the existing natural gas pipelines. IE proposes a permanent ROW between 40 and 50 feet in width. IE's permanent ROW would overlap AGT's existing ROW between MP 0.1 and MP 6.1 and portions of the BSR ROW between MP 6.1 and MP 10.1 by between 0 and 30 feet. (AGT/IE 1a, pp. 7, 9, 65, Table 3; AGT/IE 1a, Appendix 2; AGT/IE 21, RPHQ TB-8; Tr. 5, p. 62; Tr. 8, pp. 232 to 236)

55. Temporary workspaces would be required for the staging of construction equipment and materials for the proposed pipeline at locations along IE's proposed route near wetlands, waterbodies, roads, railroad tracks, or utilities; in residential and agricultural areas; and in areas with solid bedrock and steep slopes. Temporary workspaces would generally be located adjacent to the proposed construction ROW, but no closer than 50 feet from the edge of a wetland or a waterbody. Two additional temporary workspaces would also be required at MPs 8.04 and 8.91 along the existing AGT pipeline for the proposed hydrostatic test manifolds. (AGT/IE 1a, pp. 10, 11, 23, 26, 28, 33, Table 4; AGT/IE 15, RPHQ #46; AGT/IE 19, RPHQ #60; AGT/IE 24, RPHQ BLT-2; TG 4, RPHQ 5; Tr. 5, p. 64)
56. Most existing land uses would be able to continue within the proposed permanent ROW after construction; however, the installation of new structures would be prohibited. (AGT/IE 1a, pp. 121; Tr. 8, p. 174)
57. IE would use approximately ten acres of a 17.9-acre parcel located on Toelles Road in Wallingford to stage construction materials and equipment for the proposed pipeline. The Toelles Road contractor/pipe yard is currently zoned for industrial use. At the proposed contractor/pipe yard, IE would install and maintain erosion control structures, as required; implement and comply with the Spill Prevention, Control, and Countermeasures (SPCC) Plan; and restore and revegetate all disturbed areas, as required. (AGT/IE 1a, pp. 13, 117; AGT/IE 1a, Appendix 1, Topographic Map titled Proposed Toelles Road Pipeyard; AGT/IE 1a, Appendix 3, pp. 3-2; AGT/IE 26, Appendix H, p. 23)

Proposed Pipeline Installation (Terrestrial)

58. Construction of the proposed pipeline would involve numerous crews working in succession along the proposed construction ROW, closely behind the proceeding crew, performing the following functions: surveying, vegetative clearing, installation of erosion control features; grading, trench excavation, stringing, welding, pipeline installation, backfilling, testing, rough cleanup, and finish cleanup. (AGT/IE 1a, pp. 13, 14, 107; AGT/IE 1a, Appendix 3, p. 3-3; AGT/IE 26, p. 19)
59. Grading of the proposed construction ROW and temporary workspace areas would be required to create a safe and level work surface. Topsoil would be stripped to a maximum depth of twelve inches over the trench and subsoil storage areas, and stored separate from the subsoil on the construction ROW, except where there is standing water or saturated soils. (AGT/IE 1a, pp. 14, 19, 20, 27, 64, 110, 111, 112; AGT/IE 1a, Appendix 3, p. 3-5, Figure #11; AGT/IE 25, Nov. 2, 2001, RPHQ #39; AGT/IE 26, pp. 19, 20; AGT/IE 31; Tr. 8, pp. 224, 225)
60. Trenching would involve excavating a ditch for the proposed pipeline with either a backhoe or wheel-type ditching machine. The minimum trench dimensions for normal installation of a new pipeline must be ten feet wide and six feet deep, with a minimum of three feet of cover, to meet U.S. DOT and the Occupational Safety and Health Administration (OSHA) requirements. There would be approximately five feet of cover over the proposed pipeline in areas along the BSR tracks. In wet or sandy unstable soils, a wider trench may be necessary. Excavated material would be placed temporarily between the proposed trench and the existing C-5 pipeline. (AGT/IE 1a, p. 16; AGT/IE 1a, Appendix 3, p. 3-7, Figure #13; AGT/IE 14, RPHQ #1; Tr. 5, p. 48; Tr. 8, pp. 90, 227)

61. Material excavated from the proposed trench would be sidecast adjacent to the trench. Placement of excavated material adjacent to the proposed trench in wetlands could result in the temporary filling of a wetland. Removal of excavated material from wetlands could increase the time of construction, the number of construction vehicle trips in wetlands, the compaction of wetland soils, and the potential to introduce noxious weeds into the wetland. (AGT/IE 14, RPHQ #10; Tr. 9, pp. 31, 37, 38, 42)
62. Stringing involves the preparation of the individual pipe sections (also referred to as joints) for welding into a continuous pipeline section. The pipe sections would be placed alongside the trench, bent to conform to the proper alignment, and placed on supports to accommodate welding. (AGT/IE 1a, p. 16; AGT/IE 1a, Appendix 3, p. 3-8)
63. IE would weld each of the individual pipe sections into a continuous pipeline in accordance with the American Petroleum Institute Standard Number 1104 and AGT's welding specifications. Each weld would be radiographically inspected to determine the integrity of the welds. The weld joint area would be coated with a protective coating of fusion bonded epoxy. (AGT/IE 1a, p. 16; AGT/IE 1a, Appendix 3, p. 3-8; Tr. 5, p. 39)
64. Where residences or businesses are closer than 25 feet from the work area, either the "drag section" or "stove pipe" construction technique may be used. The drag section construction technique involves fabricating the pipeline before trenching, excavating the trench, lowering the pipeline into the trench for welding in place, and either backfilling or temporarily covering the trench. The stove pipe construction technique involves excavating the trench where construction ceased the previous day, installing single pipe sections into the trench, and welding the individual pipe sections on to the pipeline. At the end of the day, the trench is backfilled; however, the last section of newly installed pipe for either alternative pipe installation method is often not buried, but is covered with steel plates or timber mats, or surrounded by fencing. (AGT/IE 1a, p. 20; AGT/IE 1a, Appendix 3, pp. 4-2, 4-3; AGT/IE 21, RPHQ TB-11; AGT/IE 26, p. 20; Tr. 5, pp. 61, 62, 64; Tr. 6, pp. 290, 291; Tr. 8, pp. 179, 180)
65. The proposed pipeline may be installed using the "push-pull" construction technique where wetland soils are unstable or inundated. The push-pull technique would involve stringing and welding the proposed pipeline away from the wetland, floating the prefabricated pipeline across the wetland, and installing the pipeline within the excavated trench. (AGT/IE 1a, p. 27; AGT/IE 1a, Appendix 3, p. 6-2; AGT/IE 25, Nov. 2, 2001, RPHQ #39; AGT/IE 26, p. 22; AGT/IE 26, Appendix H, pp. 31, 32)
66. The proposed pipeline would be inspected for defects in the coating and repaired prior to being lowered into the trench with sideboom tractors. In rocky areas, sand bag supports may be placed on the trench bottom prior to installation to pad the bottom of the trench and prevent damage to the proposed pipeline and coating. The proposed pipeline would be covered with a layer of rock free dirt, then backfilled with the material previously removed during trenching operations. Where topsoil is segregated from subsoil, the subsoil would be backfilled first and the topsoil would be replaced on top. (AGT/IE 1a, pp. 16, 17, 64; AGT/IE 1a, Appendix 3, pp. 3-8, 3-922; AGT/IE 26, Appendix H, p. 32; Tr. 5, p. 47)

67. Trench plugs, consisting of sand bags and/or sakrete, would be installed around the pipeline within the trench. Trench plugs would typically be installed immediately up-slope of slope breakers, and at the base of slopes adjacent to waterbodies and wetlands to slow the flow of subsurface water and prevent subsurface erosion, and where needed to avoid draining of a wetland. (AGT/IE 1a, pp. 16, 17, 28, 109, 110; AGT/IE 1a, Appendix 3, pp. 3-7, 3-8, 3-9, 5-3, 6-2, Figures #14, #16, #17; AGT/IE 25, Nov. 2, 2001, RPHQ #39; AGT/IE 26, Appendix H, p. 32; Tr. 6, p. 96)
68. The construction ROW would be rough-graded after the trench is backfilled to restore it to its original contours. Excess rock would be buried within the construction work area, excluding agricultural lands, residential areas, and wetlands; windrowed along the edge of the permanent or temporary ROW with landowner permission; or disposed of off-site at an appropriate facility. Final cleanup, including final grading and installation of post-construction erosion control devices, would begin immediately after rough cleanup and would be completed within ten days after the trench is backfilled, weather and soil conditions permitting. Pre-construction contours would be restored, except in upland areas where a slight crown would be formed over the trench to compensate for settling of the backfill material. (AGT/IE 1a, pp. 18, 28, 64, 110; AGT/IE 1a, Appendix 3, pp. 3-6, 3-9, 3-11; AGT/IE 21, RPHQ TB-9; AGT/IE 25, Nov. 2, 2001, RPHQ #39, RPHQ #45; Tr. 5, p. 30)
69. IE would develop site specific plans to identify the proposed workspace, limits of the permanent ROW, and construction procedures in areas where the proposed construction ROW would be located less than 50 feet from a residence. IE could adjust the alignment of the proposed pipeline to avoid large trees, residential structures, wells, and septic systems. IE would not take any residential structures along the proposed pipeline route. (Tr. 5, pp. 56, 57; Tr. 6, pp. 289, 290; Tr. 8, pp. 166, 169, 173, 175, 179, 180)
70. The proposed pipeline would be installed across perennial waterbodies in Connecticut using the flume crossing method. The flume crossing method involves diverting the flow of the stream or river across the construction site by placing one or more flume pipes, sized to accommodate the highest anticipated flow during construction, in the stream. After placing the pipes in the stream, sand or pea gravel bags would be placed at the upstream and downstream ends of the proposed flume pipe to dam the stream and divert the stream flow through the flume pipes. A prefabricated pipe segment would be installed beneath the flume pipes. Spoil excavated from the proposed trench would be placed within the construction ROW at least ten feet from the water's edge for all waterbodies less than 30 feet in width. (AGT/IE 1a, pp. 30, 53, 76; AGT/IE 1a, Appendix 3, pp. 5-4, 5-5, Figure #30; AGT/IE 16, RPHQ #42; AGT/IE 19, RPHQ #62; AGT/IE 26, p. 23; AGT/IE 26, Appendix H, pp. 33, 34; Tr. 7, p. 249)
71. Equipment mats or timber riprap would be used as needed in wetlands to support equipment and reduce soil compaction and mixing. Construction equipment refueling and lubricating would primarily take place in upland areas more than 100 feet from the edge of wetlands or waterbodies. Concrete coating of the proposed pipeline in saturated wetlands to provide negative buoyancy would primarily take place in upland areas at least 100 feet away from wetlands or waterbodies. (AGT/IE 1a, pp. 26, 27, 29, 64; AGT/IE 1a, Appendix 3, pp. 3-10, 7-1, Figure #6; AGT/IE 1a, Appendix 3, SPCC Plan, p. 3; AGT/IE 26, pp. 21, 22; AGT/IE 26, Appendix H, p. 31)

72. Alternative construction techniques for installing the proposed pipeline beneath roads, railroad tracks, or highly sensitive areas include the horizontal boring method and the hammer method. Horizontal boring involves excavating an access pit on both sides of the road or rail, boring a hole under the ground from one access pit to the other, and installing a prefabricated segment of pipeline through the hole. The horizontal boring method requires firm soil or rock that would retain the integrity of the bore hole. The hammer method involves excavating an access pit on both sides of the road or rail, installing a casing using a pneumatic pile driver, and installing the prefabricated segment of pipeline through the casing. The hammer method is typically used in soft soils or sand where subsurface conditions may result in voids and settlement. The maximum length that the proposed pipeline could be installed using the horizontal boring or the hammer method is approximately 6,000 feet and 500 feet, respectively. (AGT/IE 1a, p. 23; AGT/IE 14, RPHQ #5, RPHQ #6, RPHQ #8; AGT/IE 19, RPHQ #83, Question 10; AGT/IE 21, RPHQ TB-2, RPHQ TB-10; AGT/IE 26, p. 18; Tr. 8, p. 177)
73. Blasting activities may be required in areas of shallow bedrock along IE's proposed pipeline route between North Haven and Branford. Pre-blast surveys would be undertaken, with landowner permission, to assess the conditions of structures or wells within 200 feet of the proposed construction ROW. Post-blasting surveys would be undertaken if the property owner(s) identify any damage or change to their properties, or if excessive ground vibrations have been recorded during the blasting operations. Alternatives to blasting in sensitive or residential areas include equipment mounted pneumatic hammers and rock boring. IE could install additional soil over the proposed pipeline to achieve the minimum cover requirements. Blasting is not anticipated along the proposed off-shore pipeline route. (AGT/IE 1a, pp. 21, 23, 52, 97, 113; AGT/IE 14, RPHQ #26; AGT/IE 26, p. 21; Tr. 6, pp. 279, 280, 281; Tr. 7, pp. 209, 210, 211; Tr. 8, pp. 49, 148, 226, 227)
74. The proposed pipeline would be installed with at least 18 inches of separation between the pipeline and any existing underground utilities. Installation of a concrete barrier, between the pipeline and the existing utility, would be installed where 18 inches of separation is not achievable. Utilities would be allowed to cross the proposed pipeline provided at least 18 inches of separation between the installed pipeline and the proposed utility is maintained. (AGT/IE 1a, pp. 23, 123)
75. The proposed pipeline would cross existing railroad tracks in North Haven, North Branford and Branford, and a number of local and state-maintained roads. Low traffic roads and driveways would be crossed using conventional trenching techniques, which would require closing the road or driveway for a short period of time, typically less than 24 hours. IE could install a temporary bridge or bypass, or close one travel lane at a time to maintain traffic. Higher traffic roads and railroads would be horizontally bored and would remain open to traffic. (AGT/IE 1a, p. 23; AGT/IE 1a, Appendix 3, pp. 4-1, 4-2, Figures #25, #26; AGT/IE 14, RPHQ #4; AGT/IE 16, RPHQ #42)
76. The applicants would require temporary and permanent access roads for the construction and maintenance of the proposed project. (AGT/IE 1a, p. 13; AGT/IE 1a, Appendix 3, pp. 3-1; AGT/IE 15, RPHQ #45; AGT/IE 19, RPHQ #83, Question 9)
77. Air quality may be affected during construction because of fugitive dust and mobile source emissions. Fugitive dust would be controlled by applying water or calcium chloride. (AGT/IE 1a, pp. 121, 140; AGT/IE 25, Nov. 2, 2001, RPHQ #40)

78. IE proposes to install the proposed pipeline and mainline valves from MP 0.0 to approximately MP 10.1 between May 2003 and December 2003. IE's contractors propose to work twelve hours per day, between 7:00 a.m. and 7:00 p.m., up to seven days a week to install the proposed pipeline. (AGT/IE 1a, pp. 45; AGT/IE 21, RPHQ TB-31; AGT/IE 26, p. 38; Tr. 8, p. 143)

Proposed Pipeline Installation (Submarine)

79. IE proposes to employ HDD, dredging, and sub-sea plowing to install the proposed pipeline approximately three feet below the sediments across Long Island Sound. A burial depth of three feet would provide stability against storm induced currents and protection against marine traffic and fishing operations. Deepwater installation would require a lay barge and a bury barge, or one barge that could serve both functions. The proposed pipeline would be welded, coated with high-density concrete to overcome buoyancy, inspected, and lowered onto the seafloor from a lay barge. The bury barge, which would be connected to the proposed sub-sea plow, would be used to excavate and backfill the proposed pipeline trench. IE could delay dredging, plowing, or other in-water construction activities until the HDD pilot hole operation has been successfully completed. (AGT/IE 1a, pp. 34, 36; AGT/IE 14, RPHQ #14, RPHQ #19; AGT/IE 19, RPHQ #70; AGT/IE 19, RPHQ #83, Question 1, Figure SK-6; AGT/IE 20, RPHQ #63; AGT/IE 21, RPHQ TB-28, RPHQ TB-30; AGT/IE 26, pp. 28, 29; AGT/IE 26, Appendix H, pp. 7, 25, 26; AGT/IE 27, p. 2; Tr. 5, p. 110; Tr. 7, pp. 105, 106, 162)
80. The lay barge would be approximately 400 feet long by 120 feet wide. Various types of service vessels would deliver fuel, pipe, workers, and supplies to the lay barge. Installation barges are typically propelled by winches attached by cables to an array of eight to twelve approximately 15-foot wide anchors. The maximum extent of the mooring anchor array would be approximately 2,500 feet to the front and back of the installation barge, and up to 2,000 feet to either side. As the lay and bury barge advance, tugboats lift the anchors from the sea floor and reposition them at half-mile intervals in the direction of movement. (AGT/IE 1a, pp. 34, 36, 78; AGT/IE 20, RPHQ #63; AGT/IE 25, Nov. 2, 2001, RPHQ #6; AGT/IE 26, Appendix H, p. 28; AGT/IE 27, p. 2)
81. IE proposes to employ mechanical dredging from approximately MP 10.9 to MP 12.0 to install the proposed pipeline because the proposed sub-sea plow typically can not operate in water depths less than 20 feet. The mechanical dredge would excavate a trench a maximum of eight feet deep by ten foot wide at the base, with side slopes extending approximately 20 feet on either side. Approximately 45,000 cubic yards of sediment would be excavated and temporarily sidecast to one side of the trench, creating a spoil pile approximately ten feet high by 60 feet wide at the base. Spoil from the trench would be used to backfill the proposed pipeline trench. The proposed dredging activity would begin following completion of the HDD operation, and may take between ten and 20 days to complete. (AGT/IE 14, RPHQ #12; AGT/IE 19, RPHQ #83, Question 1 and Figure SK-6; AGT/IE 20, RPHQ #63; AGT/IE 21, RPHQ TB-28; AGT/IE 23, RPHQ OAG-6; AGT/IE 26, pp. 28, 29, 33; AGT/IE 26, Appendix H, pp. 8, 25, 26, 27, 38; AGT/IE 27, pp. 2, 9, Figure 3; Tr. 5, p. 110; Tr. 6, pp. 25, 28, 29, 30, 32, 34, 120, 126, 128; Tr. 7, pp. 144, 146, 152, 154)
82. IE proposes to employ a sub-sea plow from approximately MP 12.0 to MP 32.15 to install the proposed pipeline because plowing introduces less sediment into the water column than other underwater construction methods. The sub-sea plow would physically cut a trapezoidal shaped trench, measuring approximately eight feet deep by ten feet wide at the bottom of the trench by 25 feet wide at the surface of the seabed, beneath the proposed pipeline and sidecast the spoil on both sides of the trench. The spoil pile adjacent to the proposed trench would be approximately two feet high by 25

feet wide at the base. The sub-sea plow would displace approximately 500,000 cubic yards of sediment during the construction of the proposed pipeline trench. After the proposed pipeline is installed to the desired depth, the sub-sea plow would undertake another pass to place the sidecast trench spoil back on top of the proposed pipeline. The sub-sea plow is preferred to other in-water installation techniques, such as dredging or hydraulic jetting, in areas where immediate backfilling of the trench is required, or where low water turbidity is desirable. (AGT/IE 1a, pp. 36, 38; AGT/IE 14, RPHQ #12; AGT/IE 19, RPHQ #66, RPHQ #69; AGT/IE 19, RPHQ #83, Question 1 and Figure SK-12; AGT/IE 20, RPHQ #63; AGT/IE 21, RPHQ TB-28; AGT/IE 23, RPHQ OAG-6; AGT/IE 25, Nov. 2, 2001, RPHQ #6; AGT/IE 26, pp. 28, 29, 33, 35; AGT/IE 26, Appendix H, pp. 8, 25, 27; AGT/IE 27, pp. 2, 3, Figure 4, Figure 16; AGT/IE 31a; Tr. 5, pp. 110, 111, 113; Tr. 6, pp. 22, 23, 26, 27, 28, 33 to 38, 70, 126, 127, 128; Tr. 7, pp. 156, 159, 160, 161, 163, 164; Tr. 8, pp. 207, 208, 209)

83. A transition basin, measuring approximately 250 feet long by 130 feet wide by a maximum of 20 feet deep, would be constructed to allow the proposed pipeline to transition from the directional drill exit hole to a depth of approximately three feet below the seafloor. The proposed transition basin would be constructed at the exit hole for the proposed HDD operation using mechanical dredging. Dredging the proposed transition basin would require the excavation of approximately 6,500 cubic yards of spoil, which would be sidecast around the perimeter of the basin, creating a berm approximately eleven feet high and 65 feet wide at the base. The proposed transition basin and associated berms would be present for approximately three months during the entire HDD operation and initial pipe laying phase. The depth of water at the HDD exit point is approximately 14 feet below mean lower low water (MLLW). Sediment from the excavation of the transition basin would be used to backfill the proposed transition basin. The proposed transition basin could be excavated either before or after the completion of the HDD pilot hole. The proposed transition basin could serve to contain bentonite released during the HDD operations. (AGT/IE 1b, Appendix 4, pp. 42, 43; AGT/IE 19, RPHQ #61, pp. 411, 412; AGT/IE 19, RPHQ #83, Question 1; AGT/IE 20, RPHQ # 63; AGT/IE 23, RPHQ OAG-6; AGT/IE 26, p. 33; AGT/IE 26, Appendix H, pp. 25, 26; AGT/IE 27, pp. 1, 2, 9, Figure 2; Tr. 6, pp. 24, 28, 29, 30, 34; Tr. 7, p. 152; Tr. 8, pp. 29, 32, 33, 49, 50, 56, 109, 198, 204, 206; Tr. 9, p. 203)
84. The proposed pipeline would be buried a minimum of three feet below the seafloor, which would satisfy U.S. DOT safety requirements and minimize impacts on bottom-fishing activities such as trawling, oystering, and lobstering. (AGT/IE 1a, p. 36; AGT/IE 14, RPHQ #14; AGT/IE 27, p. 1; Tr. 7, p. 161)
85. Four passes of the lay and bury barge would be required to lay, lower, and backfill the proposed pipeline to the desired depth beneath the sediments of Long Island Sound. Four passes of the installation barge would result in 90 to 120 anchor scars for each mile of pipeline installed. Each anchor scar would measure approximately 175 square feet in area, by approximately eight feet in depth. The placement and recovery of the anchors, and the sweep of each anchor cable would disturb the sediment and benthic community in areas adjacent to the proposed pipeline route. The use of mid-line buoys on the proposed anchor cables would reduce impacts to the seabed due to the anchor cable sweep by approximately 50 percent. (AGT/IE 20, RPHQ #63; AGT/IE 21, RPHQ TB-14, RPHQ TB-16; AGT/IE 25, Nov. 2, 2001, RPHQ #6; AGT/IE 26, Appendix H, pp. 27, 28, 30; AGT/IE 27, p. 3; Tr. 6, pp. 55, 56, 64, 65, 185; Tr. 7, pp. 166, 167)

86. The sediment transport mechanism within and adjacent to the Connecticut nearshore area is dynamic with high suspended sediment concentrations. The circulation and near bottom velocities of water currents within the Connecticut nearshore area are dominated by tides and wind, and range from 30 centimeters/second to 45 centimeters/second. Transport of sediment in the vicinity of the HDD exit hole would disperse primarily to the north and east. The circulation of water in central Long Island Sound is also dominated primarily by wind and tides with maximum near bottom velocities of 25 centimeters/second. Near bottom currents within Long Island Sound are classified as low energy, favoring settling and long-term deposition of sediments suspended during the construction process. (Docket 208, FOF #90; AGT/IE 1a, pp. 57 to 61; AGT/IE 27, pp. 5, 6; Tr. 5, pp. 105, 106; Tr. 6, p. 30; Tr. 7, pp. 178, 179, 181, 182; Tr. 8, p. 24)
87. The applicants have modeled the extent of transport and deposition of suspended sediment resulting from the proposed dredging and sub-sea plow operations in Long Island Sound. Additionally, suspended sediment would result from the anchor placement and cable sweep. Approximately five percent, or 2,200 cubic yards, of dredged material would be introduced into the water column due to the impact of the equipment with the bottom, leakage during vertical lifting, and entrainment during placement. The majority of the suspended sediment, approximately 80 percent, resulting from the proposed dredging operation would settle within approximately 60 feet of the proposed trench or spoil pile, having an average depth of approximately 1.9 centimeters. Approximately 95 percent of the resuspended sediment would settle within approximately 350 feet of either side of the dredged pipeline trench. There would be minimal re-suspension of sediments caused by the proposed sub-sea plow operations. (AGT/IE 1a, pp. 58, 61; AGT/IE 14, RPHQ #12; AGT/IE 21, RPHQ TB-14, RPHQ TB-15; AGT/IE 23, RPHQ OAG-8; AGT/IE 26, p. 35; AGT/IE 26, Appendix H, pp. 26, 27, 28, 37, 39; AGT/IE 27, pp. 2, 5, 6, 9, 10, 11, 12, Figure 15; AGT/IE 31; AG 2, #6; Tr. 5, pp. 102, 103, 109; Tr. 6, pp. 27, 28, 32, 36, 44, 66, 67, 216; Tr. 7, p. 154; Tr. 8, pp. 35, 125, 130, 132)
88. The spoil piles from the dredging operations for the pipeline trench and transition basin would be subject to erosion from tides, wave action, and storm events resulting in some re-suspension, dispersion, and deposition of sediment. IE has not evaluated the extent of re-suspension, dispersion, and deposition associated with erosion of the dredge spoil material. The effects of sedimentation resulting from the erosion of the dredge spoil pile could be minimized by decreasing the time the spoil piles are exposed to erosion; reducing the profile of the spoil piles, removing the spoil from the transition basin by barge; and/or installing sediment containment structures. (Tr. 6, p. 30; Tr. 7, p. 152; Tr. 8, pp. 23, 24, 30, 31, 32, 37, 44, 87, 88, 89, 106, 124; Tr. 9, pp. 212, 213)
89. Where the pipeline crosses foreign utilities or where the proposed pipeline does not achieve the proposed burial depth, the pipeline could be laid on the surface of the seafloor and protected with stone rip-rap or concrete mats. IE proposes to protect existing underwater utilities in Long Island Sound by providing notification to the utility owner to coordinate installation activities; restricting the placement of anchors near the utility; and by using diver-operated jetting equipment to fluidize the sediment below the proposed pipeline within 100 feet of the utility crossing. (AGT/IE 1a, p. 36; AGT/IE 14, RPHQ #29, Figure titled Typical Foreign Utility Crossing; AGT/IE 18; AGT/IE 19, RPHQ #70; AGT/IE 20, RPHQ #63)
90. IE proposes to install approximately 3,500 to 4,000 feet of the proposed off-shore pipeline each day. IE proposes to install the off-shore pipeline between December 2002 and April 2003. (AGT/IE 1a, pp. 45, 79, 91, 127; AGT/IE 17, RPHQ #21)

Horizontal Directional Drilling (HDD)

91. IE proposes to employ HDD to install an approximately 4,000-foot-long segment of the proposed pipeline along the proposed or alternative routes to minimize impacts to near shore areas. The HDD technique would involve drilling a 36-inch diameter bore hole between MP 10.1 and MP 10.9, along IE's proposed pipeline route. The proposed pipeline would extend from approximately five feet below ground at MP 10.1, to between 85 and 100 feet below the surface from the Connecticut shoreline to MP 10.7, and then would extend upward to the proposed exit hole at MP 10.9. A surface casing may be installed with a pneumatic hammer through approximately 30 feet of sediment between the bedrock and the seabed to maintain the integrity of the bore hole. (AGT/IE 1a, pp. 7, 38, 41, 61, 79, 96, 128, 150, 154, 161; AGT/IE 1a, Appendix 1, DWG No. IE-07; AGT/IE 1b, Appendix 4, pp. 33, 42, 55; AGT/IE 14, RPHQ #7, RPHQ #35; AGT/IE 16, RPHQ #54; AGT/IE 19, RPHQ #71, RPHQ #72, RPHQ #73; AGT/IE 19, RPHQ #83, Questions 1, 4, 7, 18; AGT/IE 21, RPHQ TB-3, RPHQ TB-6, RPHQ TB-18, RPHQ TB-25; AGT/IE 25, Nov. 2, 2001, RPHQ #6; AGT/IE 26, pp. 29, 33; AGT/IE 26, Appendix H, pp. 7, 25; AGT/IE 27, pp. 1, 9; TB 5, p. 14; Tr. 5, pp. 24, 110, 113, 114; Tr. 6, pp. 118, 120, 122, 123; Tr. 8, pp. 29, 48, 50)
92. The proposed HDD procedure involves drilling an approximately ten-inch diameter pilot hole from the entry side to the exit side. The HDD pilot hole would be enlarged using a reaming tool. Typically, several passes of consecutively larger reaming tools are required to achieve the required diameter of 36 inches for installation of the proposed pipeline. Once the reaming tool has enlarged the drill hole to 36-inches in diameter, a pre-fabricated pipe section would be pulled from the exit point to the HDD work area. (AGT/IE 1a, pp. 38, 79; AGT/IE 27, p. 10; AGT/IE 14, RPHQ #5; Tr. 7, p. 105; Tr. 8, p. 51)
93. The proposed HDD fluid, which is a mixture of approximately 97 percent water and three percent bentonite, would be pumped under pressure into the drill hole throughout the drilling process to turn the drill bit, seal the wall of the drill hole, transport cuttings to the surface, and lubricate the drill bit. Bentonite is a naturally occurring clay. Temporary pits would be excavated near the entry side to temporarily store the drilling fluid and cuttings. The drilling fluid and cuttings would be pumped from the temporary storage pits to an on-site recycling unit for processing and reuse. (AGT/IE 1a, pp. 38, 79; AGT/IE 14, RPHQ #5; AGT/IE 19, RPHQ #61, p. 1-1; AGT/IE 26, Appendix H, p. 26; AGT/IE 27, p. 9; AGT/IE 28; TB 5, p. 14; Tr. 5, pp. 122, 164; Tr. 7, p. 70; Tr. 8, pp. 46, 47)
94. The proposed HDD operation would release approximately 19,100 gallons of drilling fluid (3 cubic yards of bentonite) and approximately 218,000 gallons of drilling fluid (35 cubic yards of bentonite) into Long Island Sound near the proposed exit hole during the pilot hole and pipe pullback operations, respectively. The proposed HDD operation could release approximately 7.4 million gallons of drilling fluid (1,192 cubic yards of bentonite) and 737 cubic yards of cuttings into Long Island Sound near the proposed exit hole, during the reaming operations and swab pass, assuming 60 percent containment and recovery. The drilling fluid would consolidate or gel into small masses when mixed with salt water, and could be contained within the proposed transition basin. The proposed use of a casing from the sediment to the bedrock at the HDD exit hole may contain most of the drilling fluid during reaming operations. The HDD contractor has been directed by the applicants to develop procedures to contain all of the drilling fluid during the reaming operations. The HDD contractor could recover bentonite released during the proposed HDD operations. (AGT/IE 1a, p. 79; AGT/IE 19, RPHQ #61, pp. 1-1, 1-2; AGT/IE 19, RPHQ #83, Questions 5, 6; AGT/IE 21, RPHQ TB-23; AGT/IE 23, RPHQ OAG-7;

AGT/IE 26, p. 34; AGT/IE 26, Appendix H, p. 26; AGT/IE 27, pp. 9, 10; TB 5, p. 14; Tr. 5, pp. 119, 123, 159; Tr. 7, p. 99; Tr. 8, pp. 51, 52, 54, 65, 107, 108, 111 to 114, 193, 195, 196, 198)

95. An unplanned release of drilling fluid may also occur along the proposed HDD segment depending on the geology, depth and diameter of the bore hole, and the pressure and consistency of the drilling fluid. IE would implement a Directional Drilling Monitoring and Operations Program to identify, contain, and recover an unplanned release of drilling fluid. IE would employ an independent contractor to monitor the proposed HDD operations. Monitoring for an unplanned release of drilling fluid would involve remote sensing by side scan sonar and fluorometry, underwater television cameras, diver investigation, and benthic sampling. (AGT/IE 19, RPHQ #61; AGT/IE 23, RPHQ OAG-7; AGT/IE 31; Tr. 5, p. 85)
96. The proposed HDD equipment, including the drilling rig and power unit, drilling fluid pumps, electric generator sets, drilling fluid mixing and cleaning equipment, cranes and boom trucks, and associated construction vehicles, would be located within a work area measuring approximately 120 feet wide by 400 feet long. The proposed HDD work area would be located within the Tilcon barge terminal facility at approximately MP 10.1, approximately 600 feet north of the shore of Long Island Sound, approximately 250 feet northwest of the existing Tilcon barge terminal building, and approximately 220 feet east of the nearest residence on Juniper Point Road. (AGT/IE 1a, pp. 126; AGT/IE 1c, Sheet IE-A-CT-0010, Sheet IE-A-CT-0011; AGT/IE 14, RPHQ #5; AGT/IE 26, Appendix E, pp. 3, 7, 10)
97. IE proposes to undertake the HDD operations between November 2002 and March 2003. The HDD contractor proposes to work up to 24 hours per day, seven days per week. (AGT/IE 1a, pp. 45, 145, 161; AGT/IE 17, RPHQ #21; AGT/IE 21, RPHQ TB-31; AGT/IE 26, p. 38; AGT/IE 26, Appendix H, p. 38; Tr. 7, p. 104; Tr. 8, p. 143)

Vegetative Clearing and Restoration

98. Vegetative communities traversed by the proposed pipeline project in Connecticut include 2.9 miles of forested land, including forested wetlands, 1.4 miles of agricultural cropland, and 3.4 miles of open land consisting of pasture, meadow, existing rights-of-way, and open wetlands. (AGT/IE 1a, p. 65; AGT/IE 26, Appendix H, p. 14)
99. Vegetation would be cut and cleared from the proposed construction ROW and the proposed temporary workspace areas. Vegetation cleared from the proposed construction ROW would either be burned on site, chipped, or hauled away to a commercial disposal facility. Stumps would be cut flush to the ground and left in place, except where the proposed pipeline would be installed and where removal would be necessary to create a safe and level work area. Timber would be limbed, cut, and stacked on the edge of the proposed work area, used for timber riprap on wetland crossings, burned, chipped, or hauled off-site. Burning of vegetation would be conducted in accordance with state and local burning requirements and with the landowner's approval. Chipped material would be spread across the proposed work area in upland areas and incorporated into the soil. Large trees near the edge of the construction ROW would remain if they are not an obstruction to the construction activities. (AGT/IE 1a, pp. 14, 133, 134; AGT/IE 1a, Appendix 3, p. 3-1; AGT/IE 31; AGT/IE 26, Appendix H, pp. 31; TB 5, p. 10; Tr. 5, pp. 32, 33)
100. The clearing of vegetation from the construction ROW would be required up to the edge of streams and rivers; however, a 50-foot-long herbaceous strip would be maintained near the stream or

river until immediately before construction to provide a natural sediment filter and minimize the potential for erosion. Following the installation of the proposed pipeline, a strip of vegetation, which extends along the width of the ROW and approximately 25 feet back from the water's edge, would be allowed to permanently revegetate with native plant species. In wetlands, vegetation would be cut flush with the ground across the width of the proposed work area and removed from the wetland, but stump removal, grading, topsoil segregation, and excavation would be limited primarily to the area immediately over the proposed trench. (AGT/IE 1a, pp. 26, 29, 64, 68; AGT/IE 1a, Appendix 3, p. 6-1; AGT/IE 25, Nov. 2, 2001, RPHQ #39; AGT/IE 26, Appendix H, pp. 30, 31 33; AGT/IE 26, p. 22; AGT/IE 31; Tr. 5, p. 31; Tr. 6, p. 274)

101. AGT proposes to remove some vegetation along the northern and eastern portions of the proposed compressor station site. (AGT/IE 1a, p. 41; AGT/IE 26, Appendix D, p. 10; Tr. 8, pp. 137, 138)
102. Non-cultivated uplands would be seeded, limed, and fertilized in accordance with landowner or land-managing agency requirements within six days of final grading, weather and soil conditions permitting. Seeding is intended to stabilize the soil, improve the appearance of the area disturbed by construction, and in some cases restore native flora. In non-cultivated unsaturated wetlands, the proposed construction ROW would be seeded; however, no lime, mulch, and fertilizer would be used. In wetlands, IE proposes to allow natural revegetation through recruitment from the native seed bank and root masses. (AGT/IE 1a, pp. 18, 28, 64, 68, 110; AGT/IE 1a, Appendix 3, pp. 3-13, 6-2; AGT/IE 21, RPHQ TB-13; AGT/IE 26, Appendix H, p. 32)
103. In residential areas disturbed by the installation of the proposed pipeline, lawns would be re-seeded in accordance with landowner requirements. The applicants do not propose to undertake compaction testing, or soil compaction mitigation. The planting of shrubs and bushes would be allowed on the permanent ROW provided they are less than four feet in height at maturity and are not within ten feet of the proposed pipeline. Landscaping, disturbed by the installation of the proposed pipeline, could be transplanted, or replaced for visual screening. (AGT/IE 1a, pp. 20, 123; AGT/IE 1a, Appendix 3, pp. 3-13, 4-3; AGT/IE 26, p. 21; Tr. 5, p. 39; Tr. 6, p. 275; Tr. 8, pp. 147, 167)
104. In agricultural areas, topsoil and subsoil within the proposed construction ROW would be tested for compaction at regular intervals and compared with soil in undisturbed areas to identify approximate pre-construction conditions. Crop growth would be monitored within the proposed construction ROW for two years to determine whether crops return to normal yields. Agricultural use would not be prohibited within the permanent ROW, except within the operational areas of the proposed aboveground facilities. Landowners of agricultural land would be compensated for crop loss and other documented damages resulting from the proposed construction activities. (AGT/IE 1a, pp. 19, 111, 119; AGT/IE 1a, Appendix 3, pp. 4-1, 8-1; AGT/IE 26, p. 20)
105. In uplands, IE proposes to maintain a ten-foot wide corridor centered over the proposed pipeline in a herbaceous state annually, and clear the entire 50-foot-wide permanent ROW once every three years to maintain accessibility of the ROW, delineate the pipeline ROW, and to accommodate pipeline integrity surveys. In wetlands and riparian areas, IE proposes to maintain a ten-foot-wide corridor centered over the proposed pipeline in a herbaceous state. Mature vegetation, greater than 15 feet in height, within 15 feet of the proposed pipeline, may be selectively cut and removed from the permanent ROW every three years. Vegetative clearing would not be conducted between April 15 and August 1 to avoid potential interference with wildlife nesting activities. (AGT/IE 1a, pp. 45, 64, 68, 76; AGT/IE 1a, Appendix 3, pp. 53, 8-2; AGT/IE 14, RPHQ #39, RPHQ #40, RPHQ #41;

AGT/IE 21, RPHQ TB-13; AGT/IE 26, p. 19; AGT/IE 26, Appendix H, pp. 31, 33; AGT/IE 31; Tr. 5, pp. 30, 36, 38, 41, 42, 50, 51, 63, 68, 69, 70; Tr. 6, pp. 95, 274; Tr. 8, pp. 163, 164)

106. IE would conduct post-construction monitoring for two growing seasons in all disturbed upland areas, and up to five years in all disturbed wetland areas, to determine the success of the vegetative restoration activities. If revegetation in wetland areas is not successful after three years, IE would develop and implement a plan to actively revegetate the wetland with native wetland plant species. IE would conduct post-construction monitoring along its proposed pipeline ROW for the presence of excessive invasive plants in wetlands. (AGT/IE 1a, pp. 67, 69; AGT/IE 1a, Appendix 3, p. 8-1; AGT/IE 19, RPHQ #83, Question 11; AGT/IE 21, RPHQ TB-13; AGT/IE 24, RPHQ BLT-6; AGT/IE 26, Appendix H, p. 32; AGT/IE 31a; Tr. 5, p. 78; Tr. 9, p. 34)
107. The clearing of vegetation and maintenance of the permanent ROW may invite the establishment of invasive plants, which may impair recreation and cause a loss of biological diversity. Protection of native plant species and the habitats in which they occur is an objective of the Connecticut DEP. IE would minimize the spread of invasive species to native plant communities by consulting with local invasive weed experts and developing control measures. Control measures that are recommended by the Connecticut DEP Non-Native Invasive Plant Species Policy include prohibiting the intentional planting of non-native invasive species, minimizing disturbance to the extent practical, employing the use of native and non-invasive plants, and controlling or removing non-native invasive species. The Connecticut DEP recommends that continuous monitoring and removal of invasive species be undertaken for the life of the proposed project. (AGT/IE 1a, pp. 64, 66, 67; AGT/IE 1a, Appendix 3, p. 6-3; TB 5, p. 10; BLT 2, RPHQ IE-1; BLT 4, p. 10; Connecticut DEP Comments dated May 8, 2002; Tr. 9, p. 45)
108. On Branford Land Trust properties, IE proposes to maintain a five-foot-wide corridor centered over the proposed pipeline in a herbaceous state. Trees that are greater than 15 feet in height within a ten foot wide strip 30 feet beyond the near rail of the BSR tracks, may be selectively cut and removed from the permanent ROW every three years. Vegetation within the permanent ROW, 40 feet or more beyond the near rail of the BSR tracks would revert to pre-construction conditions. IE would develop an Invasive Species Management Plan for the Branford Land Trust properties crossed by the proposed pipeline. (AGT/IE 31a, p. 6; AGT/IE 32; Tr. 5, p. 43; Tr. 8, pp. 157, 158, 162)
109. Transplanting mature trees on the temporary ROW in forested areas would not be practical. Transplanted mature trees require a large root structure, without which trees would be more susceptible to wind damage and transplant shock. (AGT/IE 24, RPHQ BLT-3; BLT 4, p. 10)

Testing

110. The applicants would hydrostatically test the existing C-1 and C-1L pipelines, the proposed compressor station piping, and the proposed pipeline at one and one-half times the operating pressure, prior to placing it into service to verify its integrity in accordance with the U.S. DOT pipeline safety regulations identified in 49 Code of Federal Regulation, Part 192, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards." Hydrostatic testing involves filling the proposed pipeline with water and maintaining a test pressure for a specified period of time. (AGT/IE 1a, pp. 17, 33, 42; AGT/IE 1a, Appendix 3, pp. 3-10; AGT/IE 21, RPHQ TB-30; Tr. 6, p. 101; Tr. 8, p. 63)

111. The proposed compressor station would be tested and operated on a trial basis after completion of piping and mechanical work to verify the proper operation of safety and protective devices. (AGT/IE 1a, p. 42)
112. The applicants would acquire water for hydrostatic testing from waterbodies that are located adjacent to the existing and proposed pipeline facilities or from municipal water supply sources. AGT proposes to appropriate approximately 1,000,000 gallons of water from the Quinnipiac River, near MP 8.9 along the existing AGT pipeline, to complete hydrostatic testing on the existing C-1 and C-1L pipelines. IE proposes to appropriate approximately 1,200,000 gallons of water either from a private pond located approximately 500 feet east of the pipeline route near MP 2.2, the Farm River near MP 3.28, or Cedar Pond near MP 5.75 along IE proposed route. IE proposes to appropriate approximately 2,680,000 gallons of water for hydrostatic testing the off-shore portion of the pipeline, including the HDD segment, from Long Island Sound. The applicants would seek Connecticut DEP approval prior to any water withdrawal for the hydrostatic testing. (AGT/IE 1a, pp. 17, 33, 70, 91; AGT/IE 19, RPHQ #83, Question 3; AGT/IE 21, RPHQ TB-19, RPHQ TB-20; AGT/IE 25, Nov. 2, 2001, RPHQ #5; AGT/IE 26, Appendix H, pp. 23, 24; AGT/IE 31; AGT/IE 31a; Tr. 8, p. 63)
113. Water used for hydrostatic testing would be discharged, following filtering, onto land, returned to the waterbody from where it was appropriated, or discharged to a different waterbody after hydrostatic testing is completed, depending upon National Pollutant Discharge Elimination System (NPDES) permit requirements. Energy dissipation devices such as straw bale structures and controlled discharge rates would minimize the potential for erosion and release of sediment into nearby surface waterbodies and wetlands. If hydrostatic test water is discharged directly into surface waterbodies, energy dissipation devices would be used to reduce the discharge energy to prevent erosion. (AGT/IE 1a, pp. 17, 33; AGT/IE 1a, Appendix 3, pp. 3-10, 3-11, Figure #18, #19; AGT/IE 26, Appendix H, pp. 24, 25)
114. No chemical additives would be introduced into the water used for hydrostatic testing, nor would chemicals be used to dry the pipeline facilities following hydrostatic testing. (AGT/IE 1a, pp. 18, 33)
115. The proposed pipeline may be internally inspected after testing to detect dents or other damage, which could have occurred during construction. If the pipeline facilities fail the hydrostatic test, or if damage to the pipeline facilities is detected during the tool inspection, it would be exposed, repaired, and re-tested. IE would routinely undertake pipeline integrity surveys, consisting of system walkovers, aerial inspections, and periodic internal pipeline inspections on the pipeline systems to ensure compliance with U.S. DOT requirements. (AGT/IE 1a, pp. 18, 33, 34, 46, 64; AGT/IE 15, RPHQ #39; RPHQ #56; AGT/IE 21, RPHQ TB-8, RPHQ TB-30; Tr. 5, pp. 36 to 39, 58; Tr. 7, p. 242, 243, 246, 258; Tr. 8, p. 223)

Environmental

116. The Connecticut DEP may require in-water construction restrictions between June 1 and September 30 to protect shellfish; between February 1 and May 15 to protect winter flounder; and between April 1 and June 30 to protect anadromous fish from the adverse effects of elevated suspended sediment levels in Long Island Sound. The proposed pipeline route would not cross winter flounder spawning habitat or areas that would have an affect on anadromous fish migration. (Connecticut DEP Comments dated May 8, 2002)

117. The applicants would adhere to a Spill Prevention, Control, and Countermeasures Plan (SPCC), which incorporates the Preparedness, Prevention, and Contingency Plan, as well as other emergency provisions, during the construction of the proposed project. The SPCC Plan includes provisions for storing hazardous materials, chemicals, fuels, and lubricating oils; refueling; inspection and reporting; and prevention and response procedures. (AGT/IE 1a, pp. 52, 61, 77; AGT/IE 1a, Appendix 3, p. 7-1; AGT/IE 1a, Appendix 3, SPCC Plan; AGT/IE 26, Appendix H, p. 23)
118. The applicants would assign at least one environmental inspector to each active construction spread to monitor environmental compliance. The environmental inspector would have peer status with other inspectors and would be responsible for monitoring compliance with permit and Certificate requirements, and other environmental approvals or conditions. The environmental inspector would verify consistency with construction procedures, issue stop-activity orders and undertake corrective actions to maintain environmental compliance, document compliance with environmental requirements, prepare status reports, and act as a liaison between the construction crews and regulatory agency staff that visit the project during construction. (AGT/IE 1a, p. 44, 82, 108; AGT/IE 1a, Appendix 3, pp. 2-1, 2-2; AGT/IE 31; AGT/IE 31a; Tr. 7, pp. 254, 257; Tr. 9, p. 40)
119. IE would consider the purchase and conveyance of undeveloped parcels adjacent to land trust lands or conservation areas to the town or conservation organizations to compensate for disturbance to such conservation areas. (AGT/IE 15, RPHQ #58; AGT/IE 24, RPHQ BLT-1; Tr. 9, p. 191)

Noise

120. The State of Connecticut regulations limit noise generated at fixed industrial sources to 61 decibels (dBA) at residential properties between 7:00 a.m. and 10:00 p.m., and 51 dBA between 10:00 p.m. and 7:00 a.m. The FERC guidelines limit noise generated by the proposed compressor station *to a* level of 49 dBA, over a 24-hour period at any nearby noise sensitive area (NSA), which includes residences, schools, and hospitals. A continuous noise level of 48.6 dBA equates to a L_{dn} level of 55 dBA. A sound level of 48.6 dBA at nearby NSAs is more stringent than the State noise limit of 51 dBA at the property line. (AGT/IE 1a, pp. 141, 146; AGT/IE 26, Appendix D, pp. I, 11 AGT/IE 26, Appendix E, pp. 2; Tr. 7, p. 115; Tr. 8, pp. 133, 134, 146)
121. Noise at the proposed natural gas compressor station would be generated by the proposed turbine and compressor, the turbine exhaust, piping, cooler, and the turbine air intake system. Noise mitigation measures at the proposed compressor station would include an acoustically treated equipment enclosure, equipment silencers, and acoustical pipe insulation. Equipment with low noise characteristics would be acquired for the proposed natural gas compressor station. Noise generated by the proposed compressor station could also be attenuated by maintaining vegetation to the north and east, by relocating the proposed compressor station to the south and west into the previously cleared portion of the property. The estimated noise attributed to the proposed natural gas compressor station, assuming successful implementation of the noise mitigation measures, would be less than a continuous noise level of 48.6 dBA at the nearby NSAs. Noise generated by the proposed natural gas compressor station would not exceed the State noise limit of 51 dBA for a residential receptor at night, at the nearest property line. (AGT/IE 1a, pp. 41, 42, 143 to 146; AGT/IE 25, Nov. 2, 2001, RPHQ #50; AGT/IE 26, Appendix D, pp. 5, 12; Tr. 8, pp. 135, 136, 138, 139, 140)
122. Noise at the proposed HDD work area would be generated by the proposed drilling rig, electric motors and pumps, construction vehicles, and associated equipment. IE would implement high performance

noise control measures, including equipment enclosures, engine silencers, temporary barriers, and specialized equipment arrangement to minimize noise impacts resulting from the HDD operations at the proposed HDD work area. IE would install a temporary barrier constructed of hay bales, measuring approximately ten to 15 feet high by 400 feet long, along the western edge of the proposed HDD work area to attenuate noise by approximately 10 dB to the west of the temporary barrier. (AGT/IE 14, RPHQ #16; AGT/IE 21, RPHQ TB-29, RPHQ TB-31; AGT/IE 26, p. 31; AGT/IE 26, Appendix E, pp. 6, 7, 10; AGT/IE 31; Tr. 5, p. 19, 20, 22; Tr. 7, pp. 109, 110, 117, 140, 141, 142)

123. Construction noise is exempt from State noise regulations. The estimated noise generated by the proposed HDD activities, assuming successful implementation of high performance noise mitigation measures, would be less than a continuous noise level of 48.6 dBA at the nearby NSAs. The closest residence is located approximately 220 feet southeast of the proposed HDD work area. Noise generated by the proposed HDD operations would not exceed the State noise limit of 51 dBA for a residential receptor at night, at the nearest property line. (AGT/IE 1a, p. 144; AGT/IE 14, RPHQ #15; AGT/IE 25, Nov. 2, 2001, RPHQ #48; AGT/IE 26, Appendix E, pp. I, 2, 3, 7, 8, 10; Tr. 5, pp. 16 to 20; Tr. 7, pp. 109, 111, 115, 116; Tr. 8, pp. 136, 137, 144)

Sedimentation and Erosion Control

124. Sediment control devices, such as silt fence or straw bales, would be installed during vegetative clearing, and maintained across the full width of the construction ROW at wetland boundaries, waterbodies, and other sensitive areas until permanent vegetation is established. Additional soil erosion control devices, including temporary and permanent interceptor dikes, slope breakers, and negotiable berms, would be installed during construction. Sediment control devices would also be installed at the proposed compressor station site, where necessary, to minimize soil runoff and sedimentation. (AGT/IE 1a, pp. 14, 26, 27, 28, 29, 33, 41, 46, 64, 109, 121; AGT/IE 1a, Appendix 3, pp. 3-4, 3-5, 3-6, 3-12, 5-3, 6-2, Figures #7, #8, #9, #10, #12, #20; AGT/IE 16, RPHQ #42; AGT/IE 24, RPHQ BLT-2; AGT/IE 21, RPHQ TB-12; AGT/IE 26, Appendix H, pp. 31 to 34)
125. Interstate natural gas pipeline companies must comply with the FERC's Upland Erosion Control, Revegetation, and Maintenance Plan and the FERC's Wetland and Waterbody Construction and Mitigation Procedures (Plan and Procedures) unless approval to deviate from the Plan and Procedures is received from the appropriate state agency. IE proposes three deviations from the FERC's Plan and Procedures regarding soil compaction testing in residential areas, revegetation of affected forested wetlands, and the location of spoil within intermediate waterbody crossings. (AGT/IE 1a, Appendix 3, pp. 1-2, 1-3; AGT/IE 19, RPHQ #83, Question 14; Tr. 5, pp. 28, 57; Tr. 8, pp. 237, 238)
126. The FERC Plan and Procedures require soil compaction testing in residential areas disturbed by construction activities, and soil compaction mitigation for severely compacted residential areas. IE does not propose to perform soil compaction testing because most lawn areas do not require deep root penetration, and the freeze-thaw cycles over the next two to three years would provide natural mitigation of compacted areas. IE proposes to segregate or replace topsoil in residential areas. (AGT/IE 1a, Appendix 3, pp. 1-2, 3-5; AGT/IE 19, RPHQ #83, Question 14; Tr. 8, pp. 238, 239)
127. The FERC Plan and Procedures require that in forested wetland areas native trees be planted within the temporary construction ROW and the non-maintained areas of the permanent ROW to restore the area to the pre-construction state; that native shrub and herbaceous species be planted to revegetate the permanent ROW; and that consultation take place with state and federal agencies to determine the

density for planting the native trees and shrubs. IE does not propose to revegetate the temporary ROW and the non-maintained areas of the permanent ROW in forested wetland areas, but rather proposes to temporarily revegetate the ROW with ryegrass, and allow natural revegetation of native species to occur. (AGT/IE 1a, Appendix 3, pp. 1-2; BLT 4, p. 9; ; Tr. 5, pp. 28, 29)

128. The FERC Plan and Procedures require that spoil excavated during the proposed construction activities be placed at least ten feet from the water's edge at all waterbody crossings. IE requested a variance of FERC's Plan and Procedures to allow for the sidecasting of excavated material into intermediate waterbodies greater than 30 feet in width; however, there would be no crossing of rivers or streams in Connecticut that are greater than 30 feet in width. The placement of spoil and construction materials 25 feet from the edge of a wetland would minimize the migration of sediment and associated phosphates into wetlands. (AGT/IE 1a, Appendix 3, pp. 1-3, 3-7; TB 5, p. 12; Tr. 8, pp. 239, 240; Tr. 9, p. 28)

Water and Sediment Quality

129. No EPA-designated sole-source aquifers are located in the proposed project area. The proposed natural gas compressor station would be located within a Level A aquifer area, approved by the Connecticut DEP, and within the boundary of the State-designated North Cheshire Wellfield Aquifer Protection Area. The Cheshire Wellfield consists of six wells clustered approximately 5,000 feet south/southeast of the proposed compressor station site. The Connecticut DEP establishes aquifer protection areas around public water supply wells that are placed in stratified drift and serve more than 1,000 people. (AGT/IE 1a, p. 50; AGT/IE 19, RPHQ #83, Question 2; AGT/IE 26, Appendix H, p. 3; Memorandum of the Town of Cheshire Planning Department dated April 4, 2002; Tr. 5, p. 158; Tr. 6, p. 269)
130. AGT would comply with the Town of Cheshire's requests to allow South Central Regional Water Authority personnel rights to inspect the proposed facility for compliance with the final pollution prevention and control plan; that the site make use of all applicable Best Management Practices recommended by the Council, the Environmental Protection Agency, and the FERC; that all hazardous materials storage at the proposed compressor station site have 150 percent secondary containment; that impervious surfaces be kept to a minimum; and that clean stormwater runoff be allowed to infiltrate wherever possible. (Memorandum of the Town of Cheshire Planning Department dated April 4, 2002; Tr. 6, pp. 270, 271; Tr. 8, pp. 240, 241)
131. The applicants would develop a plan for monitoring groundwater quality and well yield for public and private water supply wells within 400 feet and 200 feet of the proposed construction work areas, respectively. The applicants would repair or replace potable water supply systems that are impaired by the proposed construction activities. (AGT/IE 1a, p. 52; TG 4, RPHQ #9)
132. Groundwater contamination from a dry cleaning facility has been identified in North Branford between Twin Lakes Road (MP 5.0) and Commerce Drive (MP 6.05). In the event contaminated soil and/or groundwater contamination is encountered during construction, IE would notify the affected landowner and cooperate with the appropriate federal and State agencies. (AGT/IE 1a, pp. 50, 133; AGT/IE 19, RPHQ #84; AGT/IE 26, Appendix H, p. 3; Tr. 8, pp. 147, 148, 149)
133. The central portion of Long Island Sound currently has a Connecticut DEP surface water classification of "SA"; the highest water quality classification suitable for marine fish, shellfish, and wildlife habitat; shellfish harvesting for direct human consumption; recreation and all other legitimate uses including navigation. (Docket 208, FOF # 87)

134. Several sediment samples were obtained in November 2001 along the proposed submarine pipeline route in Long Island Sound at approximately one-mile increments, and analyzed for metals, total pesticides, polychlorinated biphenyls (PCBs), total organic carbon, and polynuclear aromatic hydrocarbons (PAHs). The sediment samples were compared to Environmental Protection Agency (EPA) Apparent Effects Threshold (AET) levels or National Oceanic and Atmospheric Administration (NOAA) guidelines for effects range-low (ER-L) and effects range-median (ER-M) concentrations. Concentrations in excess of ER-L values may indicate levels of moderate contamination. Concentrations in excess of ER-M values are used to evaluate the potential for adverse effects to marine organisms based on short-term or acute exposure to a high level of contamination. Arsenic, copper, and nickel were detected in some of the sediment samples obtained from Connecticut waters in concentrations that exceeded the ER-L values; however, none of sediment samples exceeded the ER-M values. (Docket 208, FOF #88; AGT/IE 1a, pp. 58; AGT/IE 1b, Appendix 5, p. 6, Proposed Off-shore Data Collection Summary Sheets; AGT/IE 19, RPHQ #69; AGT/IE 23, RPHQ OAG-9; AGT/IE 26, Appendix H, p. 9; AGT/IE 31; AGT/IE 31a; Tr. 6, p. 40; Tr. 7, pp. 35, 36, 37, 45, 48, 50, 136, 147)
135. The sediment sampling undertaken in November 2001 along the proposed submarine pipeline route indicates that there is at least eight feet of sediment overlying bedrock, and that the sediment consists primarily of cohesive dark clays and clay with silt, with high water content. (AGT/IE 1a, pp. 57, 60, 71; AGT/IE 19, RPHQ #83, Question 12; AGT/IE 23, RPHQ OAG-9; AGT/IE 26, p. 34; AGT/IE 26, Appendix G, Table 3; AGT/IE 26, Appendix H, p. 8; AGT/IE 27, pp. 4, 11, Table 1; Tr. 5, p. 111; Tr. 6, pp. 55, 69, 119; Tr. 8, pp. 36, 37, 119, 123)

Wetlands

136. A total of 53 wetlands have been identified by wetland field surveys along the proposed pipeline route where access permission was granted. Short-term effects to wetlands affected by the proposed project include the loss of wetland vegetation and wildlife habitat; aesthetic impacts; soil disturbance; increases in turbidity; and fluctuations in wetland hydrology. Impacts on forested wetlands would be longer in duration than other wetland types because woody vegetation would require a longer time to become re-established within the right-of way following construction. (AGT/IE 1a pp. 62 to 64, 68; AGT/IE 1b, Appendix 6, pp. 4 to 25; AGT/IE 1b, Appendix 6, Attachment C; AGT/IE 1b, Appendix 6, Addendum 1; AGT/IE 19, RPHQ #83, Questions 9, 10; AGT/IE 26, Appendix H, pp. 9, 11, 12, 13, 31; AGT/IE 31; Tr. 5, pp. 139, 140, 143; Tr. 6, pp. 85, 86; Tr. 9, pp. 48, 50)
137. Vernal pools may be present within wetlands along the proposed pipeline route. Vernal pools provide habitat for threatened or endangered species, including various salamander species. (Tr. 9, pp. 37, 52, 56, 57)
138. Activities in a wetland could change the values and function of a wetland. Functions of a wetland are self-sustaining properties of a wetland ecosystem that include groundwater recharge/discharge; floodflow alteration; fish, shellfish, and wildlife habitat; sediment, toxicant and pathogen retention; nutrient removal, retention and transformation; production; and erosion control. Values of a wetland are benefits that derive from one or more functions and its physical characteristics including active or passive recreation; educational and scientific value; uniqueness; aesthetics; and threatened or endangered species habitat. (Council Administrative Notice 2; Tr. 9, p. 24, 25, 50)

139. Removal of mature vegetation and associated tree canopy, within and adjacent to wetlands during the installation of the proposed pipeline, would increase light penetration in a wetland and may increase the temperature of the water and soils resulting in the desiccation of the wetland and a change in the ecological community. (Tr. 9, pp. 33, 49, 53, 56, 188)
140. Minimization and mitigation of vegetative clearing in wetlands within the proposed construction ROW could include developing site specific plans for vegetative clearing, protecting mature trees that create a canopy, revegetation with native species, and the monitoring and removal of invasive plant species. The Town of Branford and the Branford Land Trust could monitor and remove invasive plant species from their properties that would be disturbed by the installation and maintenance of the proposed pipeline. The Town of Branford recommends that IE place a bond or other funding source to ensure post-construction monitoring, maintenance, and revegetation of wetlands within the proposed temporary and permanent ROW. (TB 5, pp. 10, 32, 33; BLT 1; BLT 4, pp. 10, 11; Tr. 8, pp. 160, 161; Tr. 9, pp. 35, 45)
141. The proposed construction through wetlands and the temporary placement of excavated trench material in a wetland may change the nutrient and oxygen levels, vegetation types, and hydrology of the wetlands. Limiting construction activities within a buffer area, between 25 and 50 feet in width, near wetlands would minimize adverse effects in wetlands. (Tr. 9, pp. 28, 31, 38, 48)
142. A wetland restoration plan would improve the condition of wetlands disturbed by the proposed pipeline construction by restoring the values and functions to pre-construction conditions. Failure to adopt and carry out a wetland restoration plan could alter the values and functions of a wetland, and could encourage the establishment of invasive plant species. (Tr. 9, p. 24, 25, 42)
143. There are no wetlands or waterbodies within the boundaries of the proposed natural gas compressor station site. (AGT/IE 1a, p. 70)

Habitat and Wildlife

144. The proposed pipeline route would cross 19 perennial or intermittent waterbodies, including the Muddy River, the Farm River, the Branford River, and the Stony Creek. The Farm River has been classified as a trout stream, and the Farm River and Stony Creek have been identified as supporting anadromous fisheries. (AGT/IE 1a, pp. 28, 52, 53, 69, 70; AGT/IE 1b, Appendix 6, p. 8; AGT/IE 14, RPHQ #18; AGT/IE 17, RPHQ #20; AGT/IE 26, Appendix H, pp. 4, 5, 6, 17)
145. IE proposes to undertake in-stream construction in coldwater fisheries between June 1 and September 30, and in coolwater and warmwater fisheries, considered significant by the State, between June 1 and November 30 to minimize interference with fish migration and spawning. The Connecticut DEP may impose additional restrictions on construction activities in streams supporting anadromous fisheries resources to avoid interference with migration and spawning. (AGT/IE 1a, pp. 29, 76; AGT/IE 1a, Appendix 3, p. 5-2; AGT/IE 17, RPHQ #20; AGT/IE 26, pp. 22, 23; AGT/IE 26, Appendix H, p. 33; Connecticut DEP comments dated May 8, 2002)
146. Removal of vegetation adjacent to waterbodies would increase light penetration, which may result in desiccation of the wetland, increased water temperature, and adverse effects to coldwater fisheries. The proposed pipeline construction across rivers and streams would result in a temporary increase in the sediment load in the waterbody. Sustained periods of exposure to high levels or suspended solids

may cause fish egg and fry mortality and other adverse health impacts on fisheries and other aquatic resources. (AGT/IE 1a, pp. 60, 61; AGT/IE 26, Appendix H, pp. 32, 33; TB 5, p. 10; Tr. 9, pp. 33, 49)

147. The Connecticut DEP recommends that all stream crossings be located to avoid damage to important fish habitat including undercut banks associated with roots of large streambank trees. The Connecticut DEP also recommends that the work footprint be minimized within the watercourses and adjacent riparian areas; that bio-engineering be used to re-establish stream banks versus using hard armoring; that riprap not be used on the streambed; that vegetative clearing in riparian areas be minimized, and that vegetative restoration of riparian areas be undertaken to the greatest extent possible. (Connecticut DEP Comments dated May 8, 2002)
148. An important benthic community type in the vicinity of the proposed off-shore pipeline route is the rocky subtidal habitat because of the diversity of marine plants and animals it supports. The majority of this type of hard substrate habitat generally occurs within approximately 2.5 miles of the Connecticut shoreline in the vicinity of the Thimble Islands. The rocky areas around the Thimble Islands support the attachment of algae and provides a habitat for foraging fish, crabs, urchins, snails, sponges, mussels, oysters, scallops, and numerous other organisms. Harbor seals are found around the Thimble Islands during the winter months. (AGT/IE 1a, p. 72; AGT/IE 1b, Appendix 5, p. 1; AGT/IE 26, Appendix H, pp. 15, 43; Tr. 6, p. 235; Tr. 9, p. 85)
149. The proposed project would permanently convert approximately 20.5 acres of upland and wetland forest land/habitat to non-forest habitat within the maintained permanent ROW for the life of the pipeline. (AGT/IE 1a, pp. 82, 118; AGT/IE 26, Appendix H, pp. 34, 35)
150. Construction of the proposed project would alter cover and forage habitat for wildlife; drive some wildlife away from the proposed construction area; inhibit the movement of wildlife across the proposed ROW during construction hours; disrupt the courting or nesting of birds and breeding of other wildlife on or adjacent to the proposed ROW; result in a short-term loss of habitat; and increase habitat fragmentation. No permanent barriers to wildlife would be erected, except at the proposed compressor station site and mainline valve locations. (AGT/IE 1a, pp. 42, 43, 82, 118; AGT/IE 26, Appendix H, p. 34; BLT 4, pp. 5, 6, 7)
151. The pipeline route does not pass through or near sensitive breeding or rearing areas. (AGT/IE 1a, p. 82)
152. IE consulted with the Connecticut DEP regarding the presence of state-listed endangered, threatened, or special concern species in the vicinity of the proposed route, the Short Beach Alternative route, Option 2 and Option 3 Alternative routes, but not the Sachem Head Alternative route or the Pine Orchard Alternative route. (AGT/IE 14, RPHQ #24)
153. The Connecticut DEP Environmental and Geographic Information Center, identified 15 state-listed endangered, threatened, or special concern species that have the potential to occur in the vicinity of the proposed pipeline route, based on specific habitat requirements, include seven birds, one invertebrate, and seven plants. Two state-listed endangered, threatened, or special concern species, the small yellow pond lily and the boreal turret snail, are known to inhabit Cedar Lake near MP 5.9 along the proposed IE pipeline. The proposed project would not adversely affect the small yellow pond lily and the boreal turret snail because the pipeline would not cross Cedar Lake. There are no records of the remaining state-listed endangered, threatened, or special concern species occurring in or adjacent to the proposed project corridor; however, the Connecticut DEP has indicated that there is

the potential for these species to occur in the vicinity of the proposed project corridor. (AGT/IE 1a, pp. 85 to 91; AGT/IE 1c, Sheet IE-A-CT-0006)

154. The Connecticut DEP identified seven state-listed endangered, threatened, or special concern species that have the potential to occur in the vicinity of the proposed pipeyard on Toelles Road in Wallingford, Connecticut. These species include the low frostweed, tiger beetle, three noctuid moths, Willet, and eastern box turtle. (AGT/IE 1a, pp. 90, 92)
155. No federally listed or proposed, threatened and endangered species under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the immediate vicinity of the proposed project area. State and federally listed and endangered roseate terns return to Falkner Island, located approximately four miles east of the proposed project area, in late April. Foraging roseate terns, which may travel over twelve miles, could occur within the proposed off-shore pipeline route. The proposed construction schedule should avoid affecting roseate terns and other migratory birds. (AGT/IE 1a, pp. 85, 86, 87, 91; AGT/IE 17, RPHQ #21; AGT/IE 26, Appendix H, pp. 20, 21, 44)
156. Long Island Sound is an environment used by Kemp's ridley, Loggerhead, Green, and Leatherback marine turtles that are listed as state or Federal Endangered or Threatened Species, according to the Connecticut DEP and the NMFS. These turtles, with the exception of the Green turtle, are found in nearshore waters of Long Island Sound from May 15 to November 15, after which they migrate out of Long Island Sound. The Green turtle is considered a resident species of Long Island Sound. The proposed construction schedule would be adequate to avoid impacts to the Kemp's ridley, Loggerhead, Green, and Leatherback marine turtles. (Docket 208 FOF #92; AGT/IE 1a, pp. 85, 86, 91; AGT/IE 17, RPHQ #21; AGT/IE 26, Appendix H, pp. 20, 21)
157. Long Island Sound is an essential fish habitat (EFH), defined as being necessary for fish spawning, breeding, feeding, or growth to maturity, for a variety of fish species. EFH has been designated for 18 species in or near the proposed pipeline route. IE would consult with the NMFS to minimize potential impacts on EFH and to facilitate development of conservation recommendations by the NMFS. Juvenile and adult EFH species are mobile and could avoid areas temporarily affected by increased turbidity. (Docket 208 FOF #94; AGT/IE 1a, pp. 72 to 75, 77, 78, 79; AGT/IE 19, RPHQ #68; AGT/IE 26, Appendix H, pp. 18, 19, 27, 36)
158. The Mammal Protection Act (MMPA) of 1972 established a moratorium which prohibits harassing, hunting, capturing, or killing; or attempting to harass, hunt, capture, or kill marine mammals, including dolphins, whales, and seals. Harbor seals, protected under the MMPA, are the only marine mammals that occur regularly within the proposed project corridor, and could be affected by the proposed project. (AGT/IE 1a, p. 81; AGT/IE 26, Appendix H, pp. 15, 43)
159. Direct and indirect affects on marine organisms resulting from anchor and cable arrays, trench excavation, and pipe installation would include the physical disturbance of bottom habitats; increased water column turbidity in the vicinity of the proposed pipeline; reduced respiratory efficiency from the dispersion of excavated sediments; locally increased chemical and sediment oxygen demand; the temporary displacement of mobile organisms away from the proposed construction area; and increased mortality of stressed or immobile organisms. High concentration of suspended sediments has the potential to impact benthic communities adjacent to the proposed construction area. The impact of a release of HDD fluid on the benthic community would depend on the amount of drilling fluid released, the area and thickness of deposition, and the organisms' physiological response to the

drilling fluid. (AGT/IE 1a, pp. 61, 77, 78; AGT/IE 1b, Appendix 4, p. 25; AGT/IE 1b, Appendix 5, p. 1; AGT/IE 19, RPHQ #68; AGT/IE 26, Appendix H, pp. 36, 37; AGT/IE 26, p. 37; Tr. 8, pp. 80, 81)

160. Adult lobsters, located beyond the immediate vicinity of the proposed pipeline trench, would not be affected by the increase in suspended sediment resulting from the proposed construction activities because they are mobile and naturally occur in turbid areas. The effects of suspended sediments and the release of HDD fluid in Long Island Sound may adversely affect larval lobsters. The NMFS had concerns that the proposed pipeline could impede lobster migration, if the proposed pipeline was more than half exposed. The proposed pipeline would not interfere with the migration of lobsters or winter flounder, if the proposed pipeline is buried beneath the seafloor, and the seafloor is returned to the pre-existing topography. (Docket 208, FOF #97; AGT/IE 1a, pp. 61, 70, 78; AGT/IE 19, RPHQ #68; AGT/IE 26, p. 37; AGT/IE 26, Appendix H, pp. 19, 27, 41, 42; Connecticut DEP Comments dated May 8, 2002; Tr. 6, pp. 199, 218; Tr. 8, pp. 35, 36)

Shellfish

161. Commercially harvested shellfish inhabiting Long Island Sound include the Eastern Oyster, and the hard-shell clam. The Eastern Oyster is one of the most economically and ecologically important animals in Long Island Sound. The spawning season for the Eastern Oyster and the hard-shell clam is from late June through September. Fertilized oyster eggs in the water column develop into swimming larvae which grow to a size of approximately one quarter of a millimeter over a two to three week period, and then settle on the bottom and attach to a clean hard substrate. Once the oysters set on the clean hard substrate, they grow through the winter. (Docket 208 FOF #98, AGT/IE 1a, pp. 128; AGT/IE 1b, Appendix 4, p. 25; AGT/IE 17, RPHQ #21; Tr. 6, p. 209)
162. Juvenile and adult stages of the Eastern Oyster can be found inhabiting the bottom regions of Long Island Sound where hard clean substrates, turbidity, and salinity allow. High suspended silt and sediment loads, resulting periodically from storms or man-made disturbances would adversely affect filter feeding and growth of the Eastern Oyster. Oysters and clams filter seawater in order to obtain food and oxygen. Filter-feeding activity of oysters is directly proportional to temperature, and inversely proportional to sediment load. Clams and oysters have the ability to discharge unacceptable material collected through filtration during short-term exposure periods; however, clams and oysters would assimilate contaminated suspended sediment over extended periods of time. The primary cause of death to oysters in Connecticut waters is suffocation and starvation caused by silt. Oysters do not tolerate complete burial because they would cease filtering seawater and die. Clams along the flanks of the pipeline trench or spoil piles could endure burial by suspended sediment. (Docket 208 FOF #103; AGT/IE 19, RPHQ #68; Tr. 6, pp. 50, 128, 130, 209, 210; Tr. 9, p. 120)
163. Heavy metals and toxic substances that are associated with sediment particles may become available for assimilation by the oyster and can be biologically amplified when contaminated estuarine and marine sediments are suspended and ingested. The quantity of contaminated suspended sediment, the concentration of the contaminant, the filtration activity of the oyster, and the exposure period determines the extent of toxicity. The responses of hard-shell clams to suspended sediment, temperature changes, and exposure to heavy metals and toxic substances are similar to oysters. (Docket 208 FOF #104)

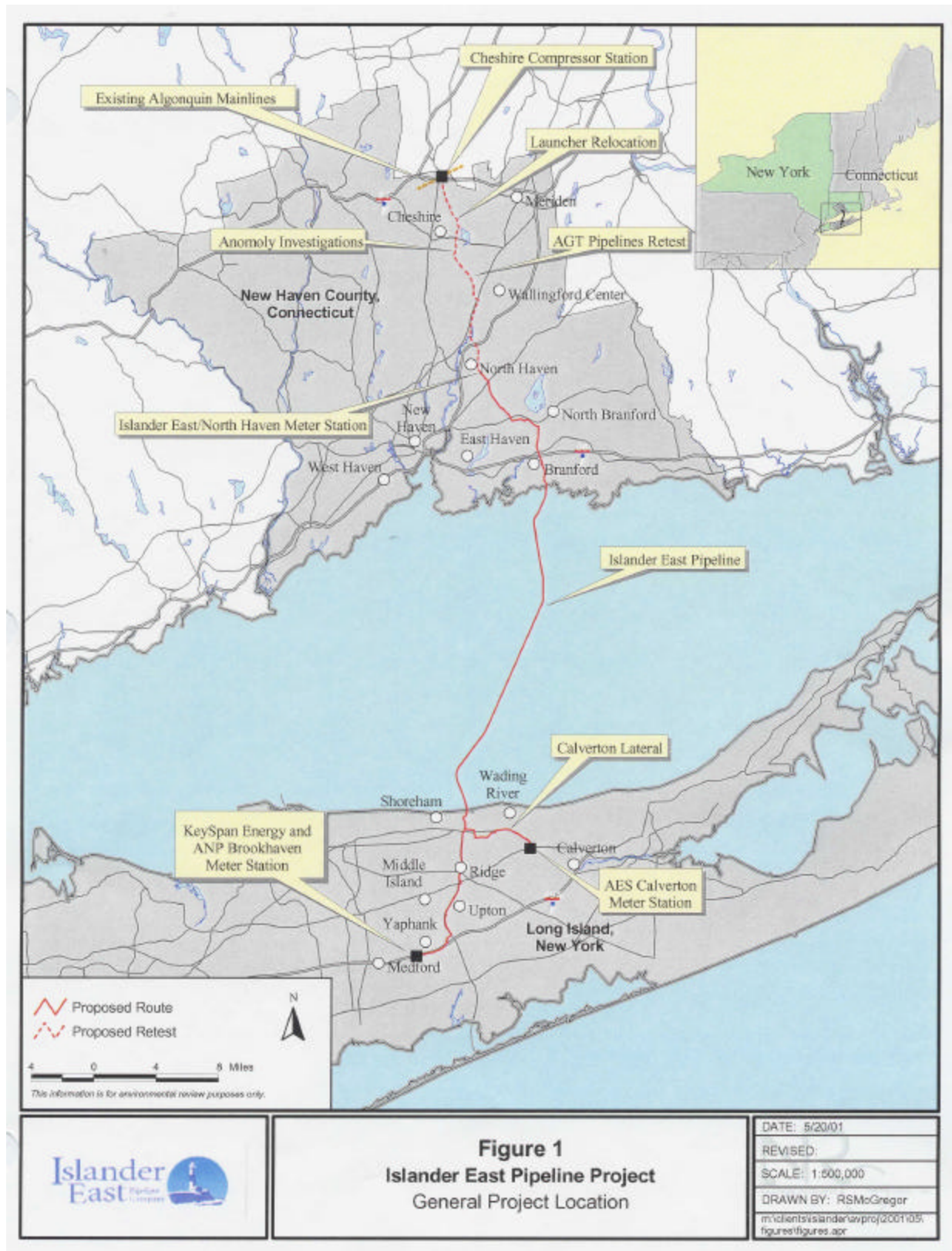
164. The proposed pipeline would be installed using HDD beneath shellfish beds under the jurisdiction of the Town of Branford. The proposed HDD exit hole/transition basin would be located approximately 500 feet south of the closest shellfish bed, located east of Rogers Island. The proposed pipeline would then be installed using either a mechanical dredge or sub-sea plow across three shellfish beds, under the jurisdiction of the Department of Agriculture, Bureau of Aquaculture, for a length of approximately 6,400 feet. The proposed pipeline would cross two shellfish beds that are not currently leased or cultivated for a length of approximately 3,900 feet. The proposed pipeline would also cross shellfish bed L-555, leased to Branford River Lobster, for a length of approximately 2,500 feet. Shellfish bed L-555 is used for clam production. Shellfish operations may be interrupted during the installation of the proposed pipeline through shellfish bed L-555. There would be no encumbrance on commercial fisherman using bottom tending nets or lobster pots, nor would there be any prohibitions to shellfish operations following installation of the proposed pipeline given the proposed burial depth of the proposed pipeline. (AGT/IE 1a, pp. 127, 128, 150, 154, 155, 162; AGT/IE 1b, Appendix 4, p. 25; AGT/IE 14, RPHQ #35, Map -03, RPHQ #36; AGT/IE 19, RPHQ #70; RPHQ #71; AGT/IE 26, p. 36; AGT/IE 26, Appendix H, pp. 19, 20, 42, 43; AGT/IE 31a; Connecticut DEP Comments dated May 8, 2002; Tr. 5, p. 134; Tr. 6, pp. 50, 51, 52, 53, 121, 124, 125, 131, 149, 150; Tr. 7, p. 107; Tr. 8, p. 79; Tr. 9, p. 88, 90, 91; Tr. 9, pp. 218, 221)
165. The depressions caused by the placement of anchors for the installation barge(s) could be an obstacle to shellfishing operations because these areas would naturally fill in with fine-grained sediment and could catch shellfishing equipment. The placement of clean shell material, "culch", in designated shellfish bed areas could be used to mitigate disturbed areas caused by the proposed pipeline construction including depressions resulting from the placement of anchors. (Tr. 9, pp. 91, 92, 108, 109, 110, 122, 130, 131)
166. IE would reseed or mitigate the commercial shellfish beds in the area impacted by the proposed pipeline installation. Reestablishment of the benthic community following disturbance of the seabed may take approximately five years, and is dependent upon the area, nature, and severity of the disturbance. (AGT/IE 21, RPHQ TB-28; AGT/IE 26, Appendix H, p. 43; AGT/IE 31a; Tr. 5, pp. 132, 133, 135, 136; Tr. 7, pp. 13, 14, 25; Tr. 8, pp. 40, 210, 212, 213, 214; Tr. 9, p. 216)

Cultural and Public Resources

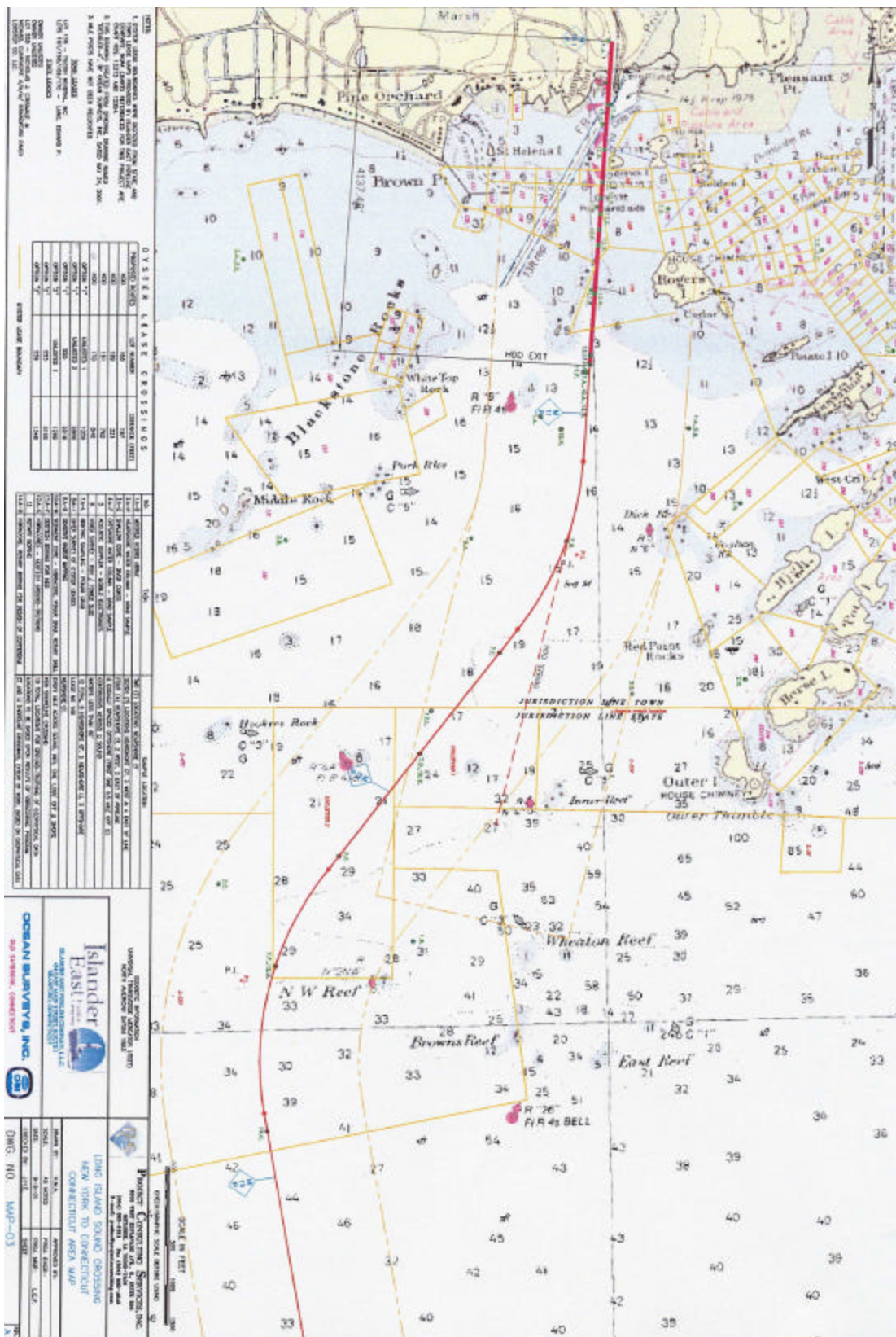
167. IE has conducted a cultural resource survey along 9.2 miles of the proposed pipeline route in Connecticut, where access permission was granted, to assist the FERC in complying with Section 106 of the National Historic Preservation Act. The cultural resource contractor did not identify any sites in Connecticut that are potentially eligible for listing on the National Register of Historic Places. The FERC would also consult with the Advisory Council on Historic Preservation and the Connecticut Historic Preservation Office. (AGT/IE 1a, p. 93; AGT/IE 14, RPHQ #25; AGT/IE 19, RPHQ #78; AGT/IE 24, RPHQ BLT-4)
168. Navigation and fishing in Long Island Sound may be impacted during the installation of the proposed pipeline in the vicinity of the proposed pipeline route due to the presence of the installation barge and support ships, the cable and anchoring system, and spoil piles. (AGT/IE 1a, pp. 127, 129, 130, 131; Connecticut DEP Comments dated May 8, 2002; Tr. 8, p. 26)

169. The proposed compressor station would be visible from portions of Interstate-691; however, the visual effects of the proposed site and compressor station building would be minimized by landscaping and architectural treatment to improve aesthetics. (AGT/IE 1a, p. 42; AGT 3, pp. 6, 7)

Appendix A



(AGT/IE 1a, Figure 1)
Appendix B



(AGT/IE 1b, Appendix 5, Attachment 1, Map-03)